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SPTS '80 MIAMI UPDATE

COOP'S SATELLITE DIGEST

JANUARY 1980



PARAFRAME



MOST-ADMIRER AT SPTS '79 was the PARAFRAME ET/3.66 (12-foot) TVRO antenna. Those who saw us go "cherry-picking" on Day Two won't soon forget the fine reception we got from ANIK-B, while using a 150° K LNA. That's big performance and if you were there YOU SAW IT! For reception photos and product information, write or phone "Mr. Paraframe," Jim Vines.

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COOP'S COMMENT ON TECHNOLOGY

AFTER WARC

The World Administrative Radio Conference (WARC) is over. Fortunately they don't happen very often; there were times during the just finished event that many nations felt there might never be another one.

During WARC nations meet in a mini-U.N. type setting and attempt to work out how the full radio spectrum (from DC to daylight as it were) will be partitioned up and utilized for the next say twenty years. Each nation has one vote and WARC breaks various frequency segments (such as 3-30 MHz, etc.) into working groups where smaller committees attempt to work out the game plan for that frequency region. There are also working groups divided by use or user definition; groups that spend time debating what allocations will be assigned to international (shortwave) broadcasting, satellite and so on. Approximately 150 nations were represented and for about half this was their first such conference. Their "nations" did not exist when the last WARC was held.

The U.S. learned a difficult lesson at this WARC. We only count for a single vote. We also learned that unlike past WARC's where most of the meaty issues were resolved during the conference proper, this time around many of the tough issues are going to continue unresolved for perhaps a decade or more. Satellite assignments and satellite policy is one of those areas.

As far as the U.S. is concerned, WARC resolved very little in the satellite area. We either lost on every significant position we backed or in the best case we saw the issues left unresolved when WARC adjourned. There will be a number of significant post-WARC gatherings during the 1980's and as a nation we'll have a few years to get our act back together.

Going into WARC the U.S. and Canada were at opposite ends of a battle over how the 11/12 GHz band would be utilized. The Canadians wanted the orbit arc carved up in a hybrid way allowing 11/12 GHz satellites in geostationary orbit to broadcast (as in direct to home) or be 'fixed' (as in point to point common carrier). The U.S. wanted the 11/12 GHz band broken up so that satellites operating could do both at once; using **part** of the 11/12 GHz downlink band for 'broadcasting'

and **part** for 'fixed'. In the final analysis neither side really won.

As it turned out the third world countries won; they want the U.S. and other satellite powers to stop using the geostationary orbit as if it belonged to them. And to not be launching future satellites without international approval on a satellite by satellite basis. The U.S. had years ago won the right to authorize its own satellites within the previously approved North American domestic satellite orbit arc (70 degrees west to 140 degrees west). If the U.S. abides by the 1979 decisions of WARC, and those yet to come in 1983, and, 1984/1986 (when a two stage space planning conference takes up where WARC left off), there will be many more constraints on orbit parking spots in the future. At not only 4 GHz but 11/12 GHz as well.

Digesting the WARC decisions is a massive task. We feel our readers are not interested in the games nations play but only the hard facts. We'll have a condensed report as the decisions impact on satellite development world wide in the February **CSD**. For now these brief highlights will tide you over:

1) WARC decided that 12.3 to 12.7 GHz will be set aside worldwide for 'direct broadcasting satellites'. If we continue to eat up 80 MHz bandwidth per transponder (as has been our habit with CTS and ANIK) that's room for five channels. On the dark side the U.S. officials are dubious that after 1984/86 the U.S. will have more than 4 orbit spots (one per time zone); maybe fewer.

2) Worldwide the 3.4 to 3.6 GHz band will be added to the 'fixed' service assignment. Except in North America where the U.S. Airforce AWACS military radar system uses this band.

If nothing more definite than the 12.3 to 12.7 allocation was decided in the 'direct to home broadcasting' area, that alone at least gives equipment designers the opportunity to zero in on the place in the spectrum where their hardware is going to have to perform. The U.S. delegation meanwhile suggested that "it will be ten years...perhaps longer, before that service is operational in the U.S.". Why? Because first Congress must amend the Communications Act to permit direct satellite broadcasting, then the 1983 western hemisphere regional planning meeting has to decide how many (and where) 12 GHz direct broadcasting slots the U.S. will get, and finally, some system for owning and operating the satellites has to be advanced, and approved.

Where does this leave us? With an in-place and operational 4 GHz 'fixed' service that will be with us in its present form for perhaps a decade. Politics, national and international, will keep us at 4 GHz long after the rest of the world has moved into 12 GHz. Like it or not, 4 GHz is our home for awhile so we might as well get used to it!

FRONT COVER/JANUARY

Microwave General's home terminal demonstration unit operating in downtown San Francisco at the WESCON show this past fall. That's Chuck Colby, MG's Chairman of the Board in the tan suit. Terminal employs MG's 10 foot antenna, International Crystal TV-4200 receiver and an Avantek 120 K LNA. **What a way to attract a crowd!**

CSD
TECHNOLOGY



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TECHNICAL BASICS CATV SYSTEM DESIGN

ONCE ON THE GROUND...

As more and more individuals complete their private (home) TVRO receiving terminals and start producing quality pictures with their own effort and invested capital, the interest in the **system** begins to expand. One direction many private TVRO terminal operators are exploring is re-distribution of the satellite signal(s) via a privately owned coaxial cable distribution network.

The cable distribution technology (CATV for short) is as mature as the satellite (TVRO) technology is emerging. Very little of a new and revolutionary nature has really happened in the CATV field in the past five to seven years. New advances in technology have largely been geared to improved reliability, and towards reducing (or maintaining in inflationary times) the price of hardware readily available for the tasks at hand.

There are several key areas of discussion for anyone contemplating sharing his private TVRO terminal with one or more additional residences. In a companion feature appearing in this month's **CSD Programming Section** we look at some of the more important aspects of the 'legal requirements' in cable system operation. Any student of the technology involved in cable must be prepared to also become a legal student of the FCC (and state and local) laws and rules in this area since at best they are confusing and often conflicting.

Legally, there are **two** national entities involved in cable system operation that we need to concern ourselves with. We repeat this statement in the companion Programming Section feature because it is important. The FCC has a complex set of rules governing cable system operation. This one you expect. However, a lesser known entity into cable operations is the Office of Copyrights. FCC rules define a cable system as any coaxial distribution system carrying off-air television broadcast signals to 50 or more homes. Below 50 homes, the FCC does not consider you to be a CATV system. The Copyright folks, on the other hand, are not as lenient. Any system that connects to **two or more** separate residences or non-commonly owned and operated buildings is by Copyright definition a cable TV system'. A more detailed discussion of

what this means follows in the Programming Section.

Technically, a small cable television is no longer a complicated electronic animal. **See diagram one.** Cable system design revolves around a few easy to understand principles:

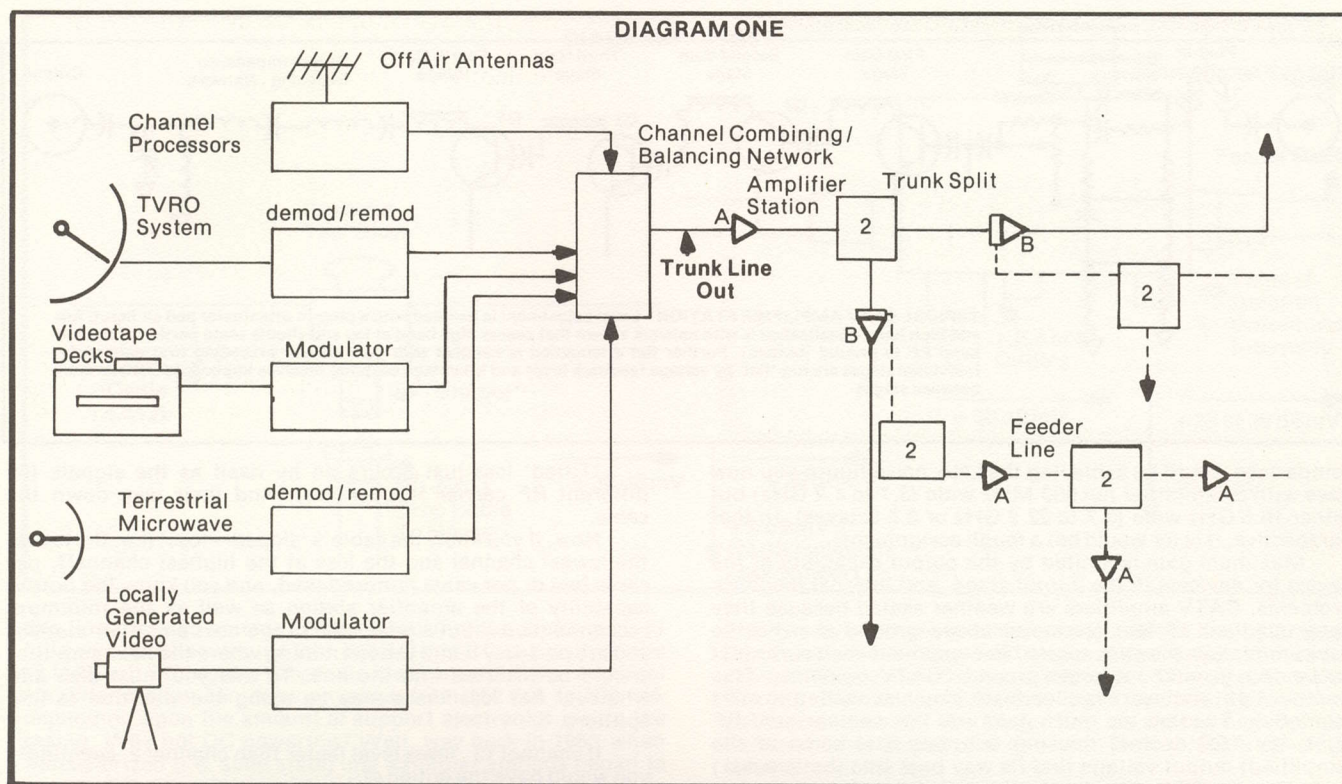
- 1) Everything starts off in the system at the 'headend'. In cable language, this is where the off-air, cable, locally generated and other signals originate their in-cable trip.
- 2) The system design is predicated on two factors: each television receiver interconnected to the coaxial network is supposed to receive some minimum level of television signal, and, the total system is a fairly delicate balance between (known) cable attenuation characteristics and (known) cable-repeater amplifier gain parameters.

The FCC suggests that all television receivers interconnected shall receive a minimum signal level of 0 dBmV (1,000 microvolts) as measured across 75 ohms, on the weakest (or lowest level) channel carried by the cable system. At the same time the FCC says that the maximum signal level for the strongest signal delivered shall not be more than +12 dBmV (4,000 microvolts), and, that any two immediately adjacent signals (such as channels 2 and 3) shall not be more than 3 dB apart in signal level as measured at the subscriber receiver. As you might suspect, the cable industry measures RF signal levels with an RF type voltmeter, frequency selective, known generally as an FSM (field strength meter) or SLM (signal level meter). A typical measurement unit has a calibrated (+/- 1.5 dB accuracy nominal) meter scale, a tuning control that allows the user to dial up the respective visual and audio carriers for each TV channel, and a selection of attenuator pads (calibrated) with which he can adjust the 'range' of measurements (not unlike one has with a VOM). Prices range from \$150 for simplistic meters with limited 'ranges' (intended for people who install cable at homes and where the variation range in signal levels is small) to \$1,500 machines that include built in spectrum analysis options.

DIAGRAM ONE

The headend can be designed to combine numerous different RF carrier frequencies onto the distribution coaxial cable. These RF carriers can be exactly as taken off the air with locally installed receiving antennas [although they must be amplified, in some cases 'filtered' and in all cases level-adjusted to suit the design requirements of the cable system], or, they can be satellite signals received at 4 GHz, demodulated to baseband, and then re-modulated again back to a desired RF carrier frequency with the aid of a 'TV modulator'. Or, the cable distributed signals starting at the headend can be locally originated either with live studio equipment or from videotape decks, in both cases the baseband video [and audio] is plugged into a TV modulator which places the baseband signals into the system on a chosen RF carrier frequency.

Whatever the source of the programming material [and there are other possibilities such as terrestrial microwave delivered signals, computer generated video displays of news and weather, etc.] it all flows into the headend for



'shaping', balance and mixing.

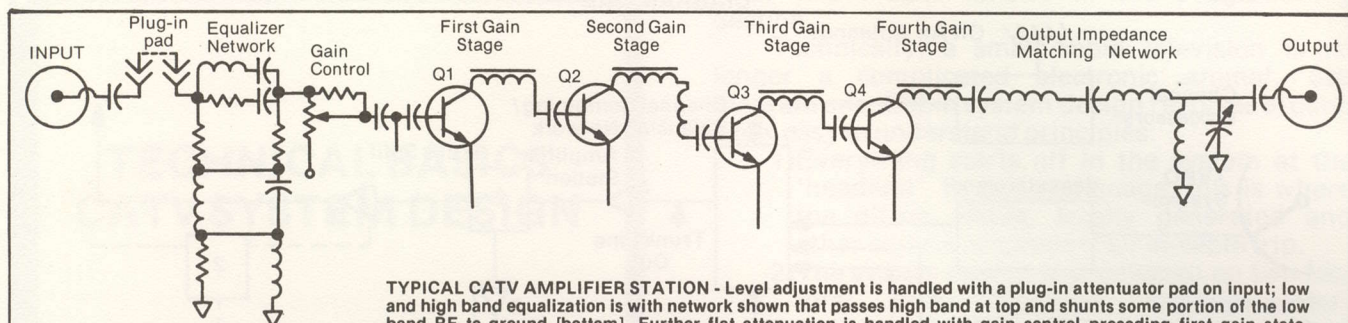
The cable engineer looks at his channel spectrum to be carried and he looks at the **loss** (or attenuation) characteristics of his coaxial cable leaving the headend. Since loss is directly related to frequency, coaxial cable (of any type) loses voltage level (i.e. signals get weaker) faster at the higher frequencies (such as TV channel 13 or 211.25 to 215.75 MHz) than say at channel 2 (55.25 to 59.75 MHz). A cable system designer thinks in terms of 'balance'; he wants to design the system with as few active parts (i.e. amplifier stations) as possible while at the same time maintaining as high a signal to noise (and signal to interference) ratio as possible. Knowing the loss of the coaxial cable at all cable — carriage frequencies, he can compute how many feet he can go **between the headend and the first amplifier station** by simply knowing what the minimum recommended input (RF signal voltage) level is for his first amplifier station. Each foot of cable adds loss; more loss at higher frequencies than at lower frequencies. Each amplifier station has a noise figure (specified by the manufacturer) and if you wish to maintain a reasonably high signal to noise ratio through the system, you compute the location of each amplifier by simply plugging it into the coaxial distribution system at a point along the cable where the cable attenuation has reduced the RF voltage levels present to the level designated as the 'minimum input level' (for a specified signal to noise ratio; a function of the amplifier station's noise figure).

Working backwards, if cable loss per foot is known (for each frequency of interest), and the minimum input level for an amplifier station is also known, there is one more variable missing; the maximum output capability for the headend equipment. Most commercial headend equipment is capable of RF output levels in the +40 to +65 dBmV (100,000 microvolts or 0.1 volts to 1,800,000 microvolts; or 1.8 volts). The whole cable world functions in the dBmV language where 0 dBmV is equal to 1,000 microvolts. Yes, there are both — dBmVs and + dBmVs.

Selection of the distribution cable type is important since some cables (because of their electrical properties or size; measured always by the cable's diameter) have less loss than other cables. Obviously less loss per foot is desirable since

this translates to greater distances between the headend and the first amplifier, and between subsequent amplifiers. By and large you get less loss only with larger cable diameters; the same principle that holds for your TVRO coaxial cable run. Larger cables also (as you would suspect) cost more money and there is a trade off here between using larger cables and fewer amplifiers or smaller cables and more amplifiers. In very large cable systems (with hundreds of miles of cable plant and dozens of amplifier stations in 'cascade') there are also electrical limits to the quality of the signal to noise (and signal to amplifier generated interference) one finds at the 'end' of such large plants. So in very complex cable plants there is often a 'quality consideration' that enters the equation for cable selection; if changing from a particular small type of cable for the system to a larger type of cable will reduce the total number of amplifier stations that will be in 'cascade' (or series) along the longest leg of the plant from say 64 to 32 amplifiers, this is often the choice of the designer since he knows that each time he **doubles** the number of amplifiers in cascade he reduces the signal to (amplifier generated) interference ratio by 3 dB.

These are nice things to know but for most designers of relatively small cable distribution plants such problems are more academic than real world. The cable amplifier stations have a **minimum input level** (to maintain a desired signal to noise ratio), a **maximum gain** (determined by the number of stages within the amplifier) and a **maximum output capability** (determined by the rating of the output stage—in a single ended amplifier design, or output stages—in a push—pull output design). Minimum input levels have been discussed and should be readily understood by most TVRO builders. The principle is the same as with LNA noise figures; too much amplifier noise degrades the signal to noise ratio and to maintain a high signal to noise ratio the input signal must be jacked upwards when the noise figure or temperature is by design quite high. A typical CATV amplifier station has a noise figure in the 9—11 dB region. Yes, this is very high by modern VHF techniques but this noise figure has to be achieved across a relatively wide spectrum (typically 50 to 300 MHz in a modern cable amplifier) and this 2.5 octave frequency span presents some tough problems for low noise design. A microwave



TYPICAL CATV AMPLIFIER STATION - Level adjustment is handled with a plug-in attenuator pad on input; low and high band equalization is with network shown that passes high band at top and shunts some portion of the low band RF to ground (bottom). Further flat attenuation is handled with gain control preceding first gain stage. Individual stages are run 'flat' by voltage feedback loops and interstage coupling involves impedance transformers between stages.

comparison would be achieving the LNA noise figure you now have with an amplifier not 500 MHz wide (3.7 to 4.2 GHz) but rather 18.5 GHz wide (3.7 to 22.2 GHz or 2.5 octaves). In that perspective, it is (or would be) a tough assignment!

Maximum gain is limited by the output capability of the device (or devices) in the output stage, and internal feedback problems. CATV amplifiers are weather sealed because they hang out their 18 feet (or more) above ground in a hostile environment; or they are spotted in equipment enclosures just above the ground in 'underground' CATV systems. This weather tight enclosure is a feedback loop just waiting to start oscillating. To cram too much gain into the weather (and RF tight—by FCC decree) housing is to beg that some of the (amplified) output voltage find its way back into the (weaker) input circuits. RF feedback with video modulated carriers is an experience you don't want to have! So typically between 22 and 30 dB of gain is about all one finds inside the amplifier housing.

Maximum output capability is a function of the device(s) chosen for the output stage(s). Any amplification device will start distorting when the sum of its input signal plus its own gain exceeds the RF output level the device is rated to handle. All CATV amplifiers are linear; they operate in a mode that is designed to insure that the RF waveforms that enter the stage or amplifier station come out of the stage or amplifier stages looking just like they went in; only stronger. Any device that operates in a linear mode has a relatively low efficiency level and an output capability that is substantially reduced from the output capability of the same device operating in a non-linear (such as Class C) mode.

DIAGRAM TWO

There are two types of loss of interest to the cable system designer; 'flat' loss, and 'tilted' loss. Flat loss means that the (RF) voltage present drops equally without regard to frequency. Channel two and 13 drop at the same point by the same amount. You get flat loss when you 'split' the signal present into two or more segments. 'Tilted' loss (or slope as it is sometimes mis-named) is a function of the coaxial cable's attenuation characteristics. If the loss per 100 feet is 0.78 dB at channel 2 (55.25 MHz) and 1.62 dB per 100 feet at channel 13 (211.25 MHz), the system designer has to plan that his channel 13 signal is going to end up going onward 0.84 dB weaker (per 100 feet) at 13 than at 2.

You create split loss by reaching a street corner and having to halve or third or quarter the signal coming from the headend into two or three or four parts. You do this with a 'signal splitter' (two-way, three-way, etc.). A signal splitter intended for outdoor (i.e. hung up on the line) use is weather tight and of 'hybrid' design. Hybrid design in this application simply means there is isolation between any two of the output ports such that the loss between two output ports is purposefully high to insure that there is no interaction (or RF feedback paths) between 'legs' of the line. In theory when you split a signal into halves, you lose 3 dB of (flat) signal voltage. In practice you actually lose more like 3.75 dB or a tad more. In quarters you lose 6 dB in theory and typically 7 dB in practice.

'Tilted' loss just occurs all by itself as the signals (on different RF carrier frequencies) wind their way down the cable.

Now, if you know the cable's 'sloped—loss' (i.e. the loss at the lowest channel and the loss at the highest channel), per cable foot or per cable hundred feet, and you know the output capability of the amplifier station as well as the minimum recommended input signal level of the next amplifier station, you are part way home to determining where the next amplifier should be inserted into the line. To this you must also add whatever flat loss there may be along the way due to line splitters.

If channel 13 loses level faster than channel 2, seemingly you would have the option of:

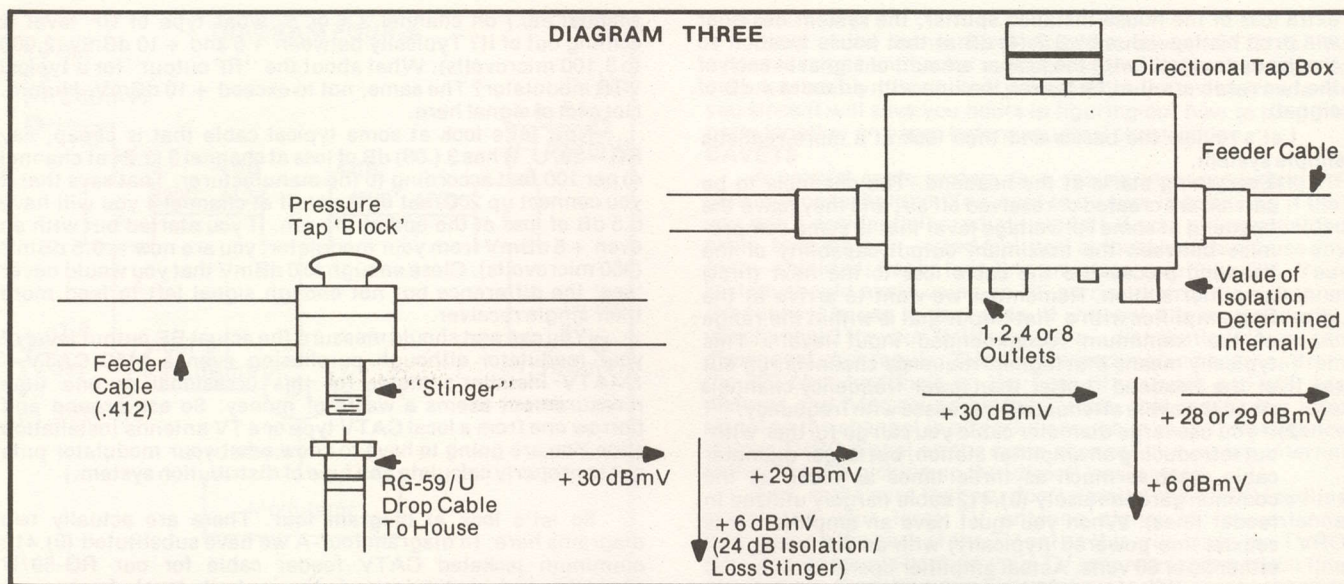
- 1) Operating the amplifier station in a 'tilted' output condition where the output level on channel 2 is reduced from channel 13, so that the next amplifier receives a 'flat' (i.e. same level across the band) input at its minimum recommended level, or,
- 2) Operating the amplifier station in a 'flat' output condition where the output is flat across the band but the next amplifier input circuit has a tilted RF voltage level condition.

Both methods have been in practice; only one prevails in a modern system. If the output stages operate 'flat' you ease up the design parameters considerably (remember these are linear operated stages). But if this also means that you operate the input to the next amplifier tilted (i.e. 13 higher than 2) and crank down the lower end channels with a form of frequency selective attenuator. This raises the noise figure on the amplifier's input circuit which is basically bad news since noise tends to add through a cascaded system.

In a modern system the input is run flat and the output is run tilted; although the actual tilt usually takes place electronically in an intermediate stage. Let's say the input is +10 dBmV and the output calls for +36 dBmV on channel 13 and +28 dBmV on channel two (with a linear slope between the two extremes). This says the amplifier station must contribute 26 dB of gain (+36 dBmV output minus +10 dBmV input) on channel 13 and 18 dB of gain (+28 dBmV output minus +10 dBmV input) on channel 2. If the 'tilt' is built in (with variable controls) on a 'buffer' stage located between the first amplifier (input) and the last amplifier(s) (output), we have a bit of the best of both worlds. Not all amplifiers work this way; some simply place a 'tilt control' network (pot operating across a varactor diode tuned input circuit) on the input and let it go at that. Since the additional (tilt) loss is always added at the low end of the spectrum (i.e. channel 2 up) there is some wisdom in this approach; the noise figure of the amplifier is apt to be naturally lower and less critical at the low end of the spectrum than at the higher end (channel 13 down). If only a few amplifiers are going to operate in cascade, you can usually get by with this less expensive approach to system 'balance'.

This might be a good point to note that CATV amplifiers are (coaxial) line voltage fed; 30 or 60 VAC (not DC) is duplexed onto the coaxial cable through isolation-rated step down transformer power supplies that turn the normal 120 VAC into

DIAGRAM THREE



this line-carriage voltage. Within the amplifier stations $\frac{1}{2}$ or full wave rectifier circuits turn the AC into DC (typically in the 18 to 28 volt DC region) to operate the line amplifiers. A typical amplifier station can draw anywhere from 150 mA to 500 mA depending upon the amount of support electronics inside the casing. Why not DC powering? Well, way back in 1963 when transistorized (i.e. solid state) line amplifier stations began to appear DC powering was tried. But unfortunately the cable fittings of that era were anything but moisture tight and moisture leaked into the fittings. Moisture **plus** dissimilar metals **plus** an often healthy amount of DC current flowing added up to terrible cases of electrolysis. Sort of like the gunk you see on your battery terminals after a long hard winter with the family vehicle. RF didn't like this gunk and the cable industry bailed out of DC and switched to AC in a hurry. And with a few exceptions, they've stayed that way ever since.

DIAGRAM THREE

The modern cable system typically has two types of 'lines' running. The master line is called a trunk line. That means it is sacred, pure of contamination, designed to inter-connect portions of town with the headend. Customer homes are **not** connected to the trunk line except in rare cases. The best quality amplifiers (i.e. most gain, lowest noise figures, highest signal to noise operation) are found on the trunk. The 'trunk' theory is sort of like the investment plan that calls for you to live only off the interest of your savings, not your principal.

The other line category is the 'distribution' or 'feeder' line. This is where you find the customers hooked up. There are two common ways to extract a prescribed amount of signal out of the feeder line and coax (pun intended) it into the house. Years ago the cable industry utilized a device known as a 'pressure tap'. This was (and still is since many smaller systems still use them) an attachment that connects to the feeder cable by taking a small tool (called a 'coring tool') and drilling or coring a small hole through the cable's outer shield (typically a solid aluminum jacket these days), on through the poly insulation and up to (but not through) the copper or copper-coated/clad-center conductor. Then a 'block' attachment is fitted over the hole grasping the line and aligning with the cored hole. Into the cored hole a 'stinger' is inserted (by screwing into threads on the attachment device). The 'stinger' may have a capacitive or a resistive element inside and the value of the capacitor or resistor determines how much RF signal voltage is 'tapped' out of the feeder line. A piece of smaller (flexible) cable such as RG-59/U (or RG-11/U if the run is quite long) then carries the cable signals on into the residence.

A more modern approach to extracting a prescribed amount of signal out of the feeder line is the 'directional tap'.

This is a hybrid network that inserts into the line by breaking the line and inserting both ends of the break into special captive fittings machined onto the ends of the directional tap. The directional tap provides high isolation between the customer's line and the feeder line, as well as high isolation between other sets on the line even if they 'come off of' the same directional tap.

Both pressure tap 'stingers' and directional taps are available in many values of 'loss' or isolation. That means that the system designer selects a 'value' for a location based upon the amount (level) of RF energy present at that point on the feeder line. Obviously if the customer is to be hooked to the line shortly after an amplifier station the RF voltage levels are quite high (because cable or split loss has not taken its toll yet) whereas another customer connected down the 'span' just ahead of the next amplifier station has to get his signal from a line that is approaching the minimum RF level found on the line; established by the input level recommended for the amplifier station. Not all stinger or directional taps have the same amount of 'through loss'; which is the loss created by the tap being placed on the line. A tap located immediately after an amplifier needs only a small percentage of the total signal available while a tap located closer to an input of an amplifier needs a larger percentage of the total RF voltage level present. Tap 'values' are measured in terms of the dB of 'loss' or isolation. For example, a '25 dB tap' extracts a signal level from the feeder line that is 25 dB **below** the line level at that point. Again, this 'loss' is built into the tap by design using the proper value or combination of values for the network, or the resistors and capacitors in the actual circuit of the tap.

And this would be a good point to note that the AC amplifier voltage present on the line is not allowed onto the customer's 'drop line' because to do so might cause damage to the TV receiver connected on the opposite end. A simple AC blocking capacitor keeps the AC on its own side of the tap.

If the system designer knows the line level that will be present at a location (because of his initial plant design and amplifier placement, plus the known cable losses up to that point from the last amplifier), and he knows 'approximately' how far he will run his 'drop cable' (as well as the loss per foot/hundred feet of the drop cable), he can then select the 'value' of the tap for that location. Of course he also knows that his signal must not be lower than 0 dBmV (1,000 microvolts) when it reaches the customer's TV set antenna terminals.

And if the customer has two sets in his home? A lower cost splitter, still typically hybrid (high isolation) but housed in a non-weather tight container mounts at the house end and the drop cable plugs into that splitter, and then takes off in two separate directions to the two receivers. To compensate for the

extra loss of the house-installed splitter, the system designer will drop his tap value by 3.7 (4) dB at that house location so that he ends up still with the proper amount of signal at each of the two receivers (i.e. he **leaves** the line with an extra 4 dB of signal).

Let's review the basics and then look at a more realistic simple system.

- 1) Everything starts at the headend. The channels to be carried are created or received off air, and they leave the headend at some RF voltage level that is some compromise between the maximum output capability of the headend pieces and the cable loss to the next (first) amplifier station. Remember we want to arrive at the first amplifier with a 'flat' input that is within the range of the 'minimum recommended input level'. This typically means that higher frequency channels run out of the headend 'hotter' than lower frequency channels since the cable attenuation increases with frequency.
- 2) If you use large diameter cable you can go further without introducing an amplifier station, but larger diameter cable costs as much as three times as much as the common garden variety (0).412 cable (largely utilized in feeder lines). When you must have an amplifier, it is coaxial line powered (typically) with an AC voltage of either 30 or 60 volts. Actual amplifier operation is by DC however through a rectifier circuit built into the amplifier.
- 3) Line losses are tilted with lower losses at lower frequencies; split losses are flat affecting all frequencies by the same amount. Both types of losses must be included in calculations to determine where line amplifier stations are to be located.
- 4) Customers are fed signals through tap-off devices that have adjustable amounts of 'isolation' (or loss). You select the tap off for each location by determining how much line signal voltage is present in front of the house, how much more signal you will lose in the drop run into the house, and then working with the minimum prescribed level to the set of 0 dBmV you select the appropriate tap value.

CONNECTING UP FOUR HOMES

All of the preceding may be academic to you; all you want to do is to start off by connecting up a few neighbors to a single channel of satellite reception. You've worked out a sharing arrangement whereby they agree to watch what you want to watch (that may be some trick) and now you need to know how to get that single channel into their TV set.

Let's look first at your 'headend'. If you are utilizing a typical LM 1889 RF re-modulator (see **Howard Terminal**

Manual, etc.) on channel 3, 4 or 5, what type of RF level is coming out of it? Typically between +6 and +10 dBmV (2,000 to 3,100 microvolts). What about the "RF output" for a typical VTR modulator? The same; not to exceed +10 dBmV. Humm. Not a lot of signal here.

Now let's look at some typical cable that is cheap; say RG-59/U. It has 3 (.08) dB of loss at channel 3 (3.24 at channel 4) per 100 feet according to the manufacturer. That says that if you connect up 200 feet of the stuff at channel 4 you will have 6.5 dB of loss at the end of the run. If you started out with an even +6 dBmV from your modulator, you are now -0.5 dBmV (950 microvolts). Close enough to 0 dBmV that you would never 'see' the difference but not enough signal left to feed more than single receiver.

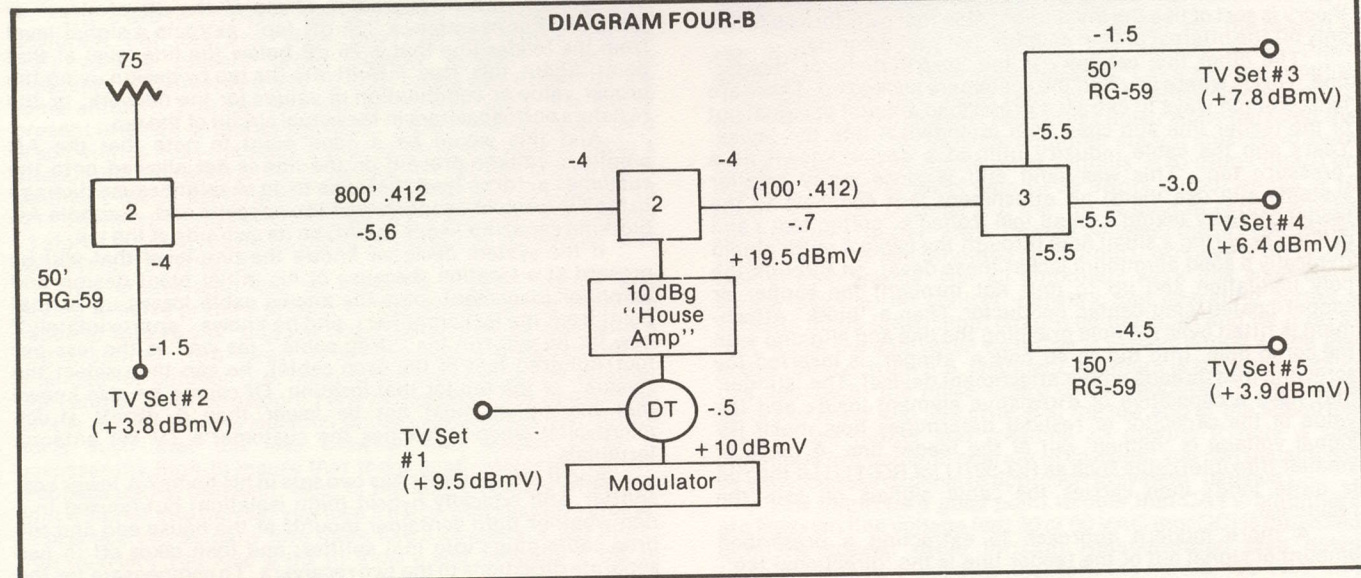
(You can and should measure the actual RF output level of your modulator although purchasing even a \$150 CATV-/MATV installer's meter for this occasional or one time measurement seems a waste of money. So ask around and borrow one from a local CATV type or a TV antenna installation shop. You are going to have to know what your modulator puts out to properly calculate any type of distribution system.)

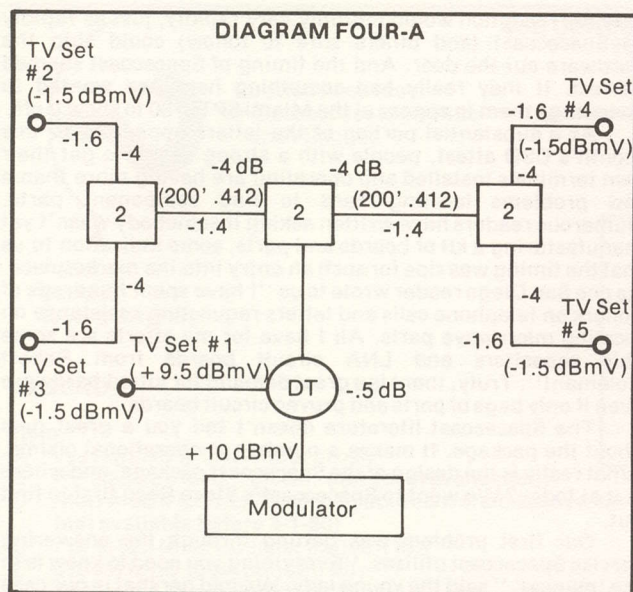
So let's look at **diagram four**. There are actually two diagrams here. In diagram four-A we have substituted (0).412 aluminum jacketed CATV feeder cable for our RG-59/U example and we've raised the output level from your modulator to +10 dBmV. We have 200 feet of .412 going in two directions after coming out of the modulator directly into a two-way hybrid splitter. At the end of 200 feet of .412 we have another two-way hybrid splitter. This gives us two house feeds off of each end of the .412 and from that hybrid splitter we run 50 feet of RG-59/U on to the TV sets. The total loss is 11.5 dB between the +10 dBmV output modulator and the input terminals on each of the four sets. We fed our own set by inserting a directional tap between the modulator output and the input to the first hybrid two-way splitter and that cost us 0.5 dB of loss. No amplifier, five sets connected and we only began with +10 dBmV.

In **diagram four-B** we have a more complex problem. One of our sets is 800 feet away from your 'headend' and the other three are in the opposite direction but quite close by. We would like to get by without any expensive CATV line amplifiers. And yet we don't want the long-distance set to suffer with a degraded signal.

We come out of the modulator through a directional tap with 0.5 dB of through loss for our local in-house outlet, and then into a 10 dB gain low-cost MATV type 110 VAC operated amplifier. Such amplifiers are typically available through Radio Shack, your local Finco or Channel Master wholesaler and often they are designed so that you have the **option** of

DIAGRAM FOUR-B





either using them as four outlet 'distribution amplifiers' (for an in-house system with separate lines to four rooms) in which case you get 0 to 2 dB gain per outlet, to +10 dB of gain if you only elect to use a **single outlet**. We'll just use one outlet on this under \$30 amplifier (with built in power supply). The output is fed to a two-way hybrid splitter that divides the signal into a pair of 'feeders'; one to the left runs 800 feet terminating in a 2-way hybrid splitter and the right leg running 100 feet and then dividing in a three-way hybrid. Note the left hand leg could have been run all of the way to the lone TV set. So why 'throw away' 4 dB of (split loss) signal? Two reasons; a hybrid splitter provides the 'system' with some isolation between the lone TV set fed on the left hand leg and balance of the system. Isolation is simply insuring that local oscillator radiation, tuner mis-match, etc. on this TV set does not feed back into the system to cause ghosting and crud on the other sets on the system. And since our feeder line chosen here is .412 cable, it is usually simpler to run the smaller (and more flexible) RG-59/U cable to the TV set inside the house than it would be to run the .412 inside the house. Note that the unused port on the two-way hybrid on the left is terminated; a 75 ohm resistor connects from the center pin to ground on the vacant port. On the right hand leg the two-way drives 100 feet of .412 cable, and the three-way hybrid. Between the three-way and the three homes connected there are various lengths of RG-59/U up to 150 feet.

FINDING PARTS

CATV and MATV parts are not difficult to locate. Several nationally distributed suppliers have extensive lines of splitters, in-house amplifiers, and fittings; including Finco, Winegard, Channel Master, Jerrold and Blonder Tongue. Wholesale electronic firms in your locale probably carry one or more of these 'brand' names. Aluminum jacketed (CATV) type cable is seldom distributed by wholesale electronic houses but it turns out that area CATV firms usually have dozens of 'tag ends' left over during their initial construction phase. Tag ends are short pieces usually under a few hundred feet long which if used by the cable company would require that they 'splice' the lines at an awkward spot (such as between poles or 'mid-span' as it is known). CATV firms pay around 7 to 9 cents a foot for .412 cable in large lots and if you offer to take some tag ends off their hands for that price range you should strike a deal. Connectors for .412 cable will have to be bought from the CATV company, through a sophisticated distributor of CATV hardware or through a firm such as DAVCO (P.O. Box 861 Batesville, Ark. 72501; 501-793-3816). DAVCO, incidentally, has an excellent selection of all of the parts you will need for virtually any size MATV/CATV distribution system and they have been dealing in mail order hardware for

nearly 30 years.

Most of the name brand suppliers have 'MATV/CATV system design handbooks' available, either as free handouts or very reasonably priced. Ask your distributor to obtain one for you since it will save you hours in figuring out how to plug the parts together on paper before you start construction.

CAVETS

A coaxial cable system is a secure, non-radiating RF distribution technique. You want to be sure in installing it that you don't accidentally radiate signal! If you utilize shielded cable, terminate unused (splitter) outputs and do not use any (non-shielded) flat or twin line anyplace, you'll be OK. Your system should avoid using an RF carrier distribution channel (frequency) **in use in your area**. If channel 4 is in use locally, use channel 3 for your TVRO signal re-distribution. If you can **disconnect** your regular TV antenna feedline (and antenna) from the 300 ohm terminals on the back of your set and **still see pictures** and hear sound on the TV set, that means the local signal on the channel is powerful enough to cause interference to your TVRO signal on the **same channel** (the wiring internal to the TV set is picking up the 'direct' local signal).

And, make sure that you don't parallel the TVRO feedline signal and your local TV antenna signal to the antenna terminals on the back of the TV set as this will cause the TVRO fed signal to couple back up your TV antenna transmission line and radiate through your TV antenna to the neighborhood! Install a switch to select between 'local' and 'TVRO'.

In a future issue of **CSD** we'll look at a more complex approach to the re-distribution system design where local off-air signals and the TVRO signal are 'married' at your headend into a single 75 ohm distribution cable.

BENCHMARK dBmV / Microvolt Levels

dBmV	Microvolts	dBmV	Microvolts
-40	10	+15	5,600
-30	32	+20	10,000
-20	100	+25	18,000
10	320	+30	32,000
5	560	+35	56,000
-4	630	+40	100,000
-3	700	+45	180,000
-2	800	+50	320,000
-1	900	+55	560,000
0	1000	+60	1 volt
+1	1100	+65	1.8 "
+2	1300	+70	3.2 "
+3	1400	+75	5.6 "
+4	1600	+80	10.0 "
+5	1800		
+6	2000		
+7	2200		
+8	2500		
+9	2900		
+10	3200		

All levels cross referenced to a 75 ohm transmission system, source-load impedances and 75 ohm measurement tool. When measurements are made with 300 ohms with a matching transformer converting 300 ohms to 75 ohms, multiply indicated readings by 2.2 to determine real levels at 300 ohms.

SPLIT ISSUE

Effective with this issue of **CSD** those people who have ordered only a single section (such as the Technical Section, which you are now reading) will be receiving only the section ordered. Prior to this time **CSD** has been supplying both sections to all readers simply because the small number of "one-section-only" readers has not made it worth our while to separate the issues. However with the subscription list growing rapidly, the time has

come to deliver to you what it was you ordered. If you have grown 'attached' to the full issue (Technical plus Programming) you may upgrade at this point by requesting same (provide your name, address and mailing label) with a \$20.00 check attached.

THE SPACECOAST KIT

A BOMBSHELL or A DUD?

The literature sheets and fliers that flooded the home terminal marketplace late in November proclaimed that a \$1200 kit or \$1600 wired and tested package was soon to be available. With this magic package of electronics you could take your own reflector surface and be in the home satellite video business. Wide distribution of the literature sheets insured that the new pieces of hardware were to be shortly the talk of every conversation where private satellite terminal enthusiasts gathered.

During the Sunday afternoon gathering on the amateur twenty meter band (the 'Satellite Group' meets Sundays at 1900 Z on 14.311 MHz) on November 18th the first enthusiasts who had received the mailing began to ask questions. **Who** knew more about the package? **What** type of hardware was involved? **Who** had designed the package? **What** type of demo was planned? **When** would delivery start.

Dale Hagert of Eagan, Minnesota typified the feelings of many when he noted "For \$1600 nobody can afford to mess with building an LNA and a receiver on their own any more...this package has got to be the most exciting thing to hit the low cost TVRO field since the service began!". Hagert was right; even if you opted not to **build** up the modules yourself (some of the Spacecoast modules were completed, others required some assembly work according to the literature) the non-kit \$1600 price tag for 'LNA + full frequency agile receiver' looked awfully good. And if you were up to building some of the modules, the \$1200 price tag looked even better!

Spacecoast Research. Just who are they and what is this package they offer?

They began by offering a reasonably priced booklet (typically \$7.95) which attempts to explain the inner workings of the satellite system to the neophyte. They advertise extensively in a diversified group of publications, from **Mother Earth News** to **Radio Electronics** to **73 Magazine**. And others as well. Their booklet package has apparently sold well, via mail order, and they have turned many people onto the satellite scene. The mail order business is an offshoot of a school the parent firm operates in the Orlando area where individuals are trained for broadcast industry positions. Their credentials for being involved in the satellite industry? Jim Vines of Paraframe notes "I guess they saw an opportunity to make some money, in a hurry, with not much investment or overhead".

Judging from the interest indicated during the Sunday gathering of the Ham 'Satellite Group' a number of people were preparing to fire off \$1600 (or \$1200) checks to Spacecoast. We were excited also because if there was a breakthrough here the number of people participating in

satellite reception would multiply very rapidly; just as rapidly as Spacecoast (and others sure to follow) could ship the hardware out the door. And the timing of Spacecoast seemed perfect. If they really had something here, **we wanted to encourage them to appear** at the Miami SPTS '80 to show it off.

As a substantial portion of the letters appearing in this month's CSD attest, people with a strong desire to get their own terminals installed and operating are having more than a few problems locating hard to find component parts. Numerous readers have written asking if somebody wasn't yet manufacturing a kit of boards and parts; some indication to us that the timing was ripe for such an entry into the marketplace. As one San Diego reader wrote to us "I have spent hundreds of dollars on telephone calls and letters requesting assistance on locating microwave parts. All I have for my efforts are some chip capacitors and LNA circuit boards from Robert Coleman!". Truly, there is a great demand for kitted hardware even if only bags of parts and proven circuit boards.

The Spacecoast literature doesn't tell you a great deal about the package. It makes a number of operational claims. What really is the design of the Spacecoast package, and where is it at today? We went to Spacecoast's Steve Reed first to find out.

Our first problem was getting through the answering service Spacecoast utilizes. "Everything you need to know is in the 'manual' " said the young lady. We told her that in our case that was not true; we mentioned our weekly TV show and the possibility that we would hop an airplane to visit Spacecoast to videotape some interviews for the program "if we could find out more about the package in advance" and that got us through the answering service to Steve Reed.

"I am sort of swallowing my words (on the announcement of our kit)...we just had...some fireworks with our engineer and we are going to be delayed on that (product)". What kind of delay? "I believe it is going to be about a sixty day delay".

Could he tell us about what he was shooting for? "We have everything worked out down to 70 MHz...we simply have to straighten out the 70 MHz on down. We have plenty of people who are willing to help us out with regard to the 70 MHz to baseband...".

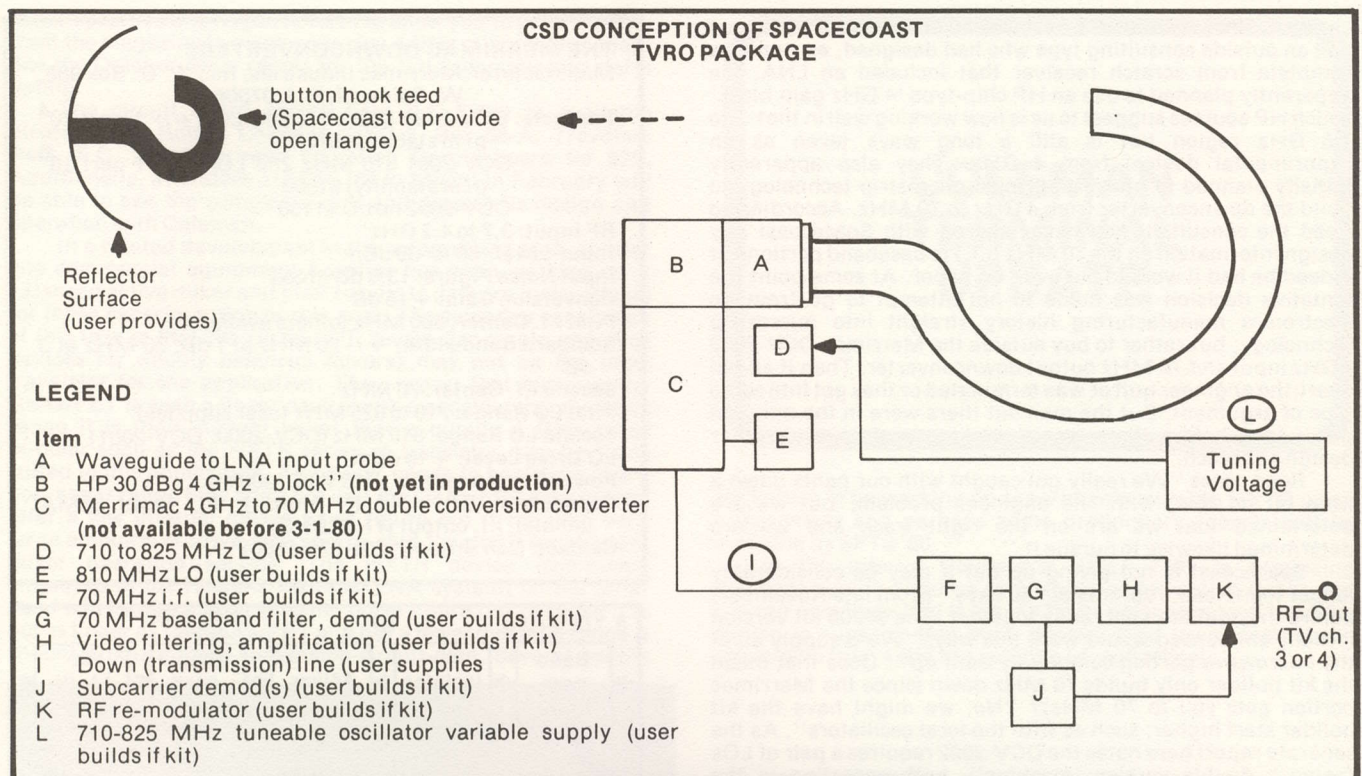
We asked about the 'front end'. Our study of their literature suggested to us Spacecoast was planning to use the Merrimac DCV-2002 package (see separate report here). "Yes, we are thinking very much towards the Merrimac although our (former) engineer had worked out a way to do that ourselves. The Merrimac package is very attractive with regards to the functional characteristics, the quality of it...if SA uses it, it is good enough for us!"

Humm. The Merrimac package (there are actually three now, with a fourth planned, as the separate report indicates) is attractive. It is also very expensive in small quantities (1 to 9) and it doesn't come down substantially until you are using several thousand per year. A firm such as Merrimac would not, we suspected, extend the large quantity pricing to someone that had no track record with microwave manufacture. Spacecoast has no such track record.

"We have this idea in mind. Let us make this package, we believe we can sell it. And as the volume picks up we will negotiate a better price. The volume for 100 per week is there if the total machine can be made. We believe that it is a risk to take to operate at very-very slim margins in the beginning but that's a risk somebody has to take and we want to take it."

The literature sheets circulated in mid-November cited a \$1200 'kit' price and a \$1600 assembled price. We asked Reed about this. "Yes, that **was** our projected price and **we may have to back off on that** a little bit because of our problems with the engineer. Initially we had intended to do everything in house, microstrip, LNA, all the way down using 'the new' Hewlett Packard chips for the front end (LNA). Because of the tremendous performance of those particular chips we (felt) we could get by with say a ten foot dish for the majority of the country."

The HP chips referenced are another new, **not yet available item**. There has been a great deal of work in places like HP and other 4 GHz transistor houses to create a 4 GHz 'gain block'; sort of a microstrip technology 'gain package' that could be simply dropped into position and wired up. Typical



desired characteristics call for 30 dB of gain in a 'block' with noise figures in the 1.5 to 1.8 dB region (120 to 150 degrees K). However, our best sources of information indicate to us that such 4 GHz 'gain blocks' on a chip are in the most optimistic cases 9 months or more away from production and even when they do reach the market one can expect them to be in tight supply for sometime. Truly, the TVRO world does need some 30 dB gain 'blocks'. Is Spacecoast designing an LNA front end around something not yet readily available or even available at all?

"We are planning to put 30 dB of gain at the LNA, an approach we believe most modern designers are following. And then we'd do down conversion at the dish (from 4 GHz to i.f.) and save yourself the hassle of forcing a relatively weak signal along a piece of expensive coax."

So Spacecoast intends to leave the dish at 70 MHz? "Well, I think that's the best approach. If we use the Merrimac package then we can place the entire downconverter out at the dish".

Humm again. Placing all of the microwave region electronics at the dish certainly is a desirable objective. Steve Birkill does such things in England with his experimntal terminal but he also worries about such things as AFC and somehow controlling the operating frequency of the local oscillator as it sits out there in a changing environment. We asked Reed about running temperature cycles on just the Merrimac portion of the downconverter. "I don't believe that we have gotten to that point yet...the people at Merrimac tell us that SA has been using (the Merrimac down converters) so...". Apparently at Spacecoast the fact that all SA electronics mounts **inside** a nice rack mounting package that is located in an environmentally controlled building has been overlooked.

Merrimac's Vito Carruso explains that while the DCV series of downconverters are typically 'flight rated' for 0 to +50 degrees C the rating is for 'go or no go'; the **stability** of an oscillator, for example, is not currently measured under varying temperatures. "We are concerned that the package continues to perform as a basic downconverter" notes Caruso "and not what happens with the oscillator stability". Of course there are several versions of the DCV series; in the one

apparently intended for use by Spacecoast, **they would provide the builder/user with their own LO modules**. Anyone who has tried to stabilize an oscillator in the 800 MHz range knows how unstable **low cost** oscillators in this region can be; especially when subjected to outside temperature extremes!

So we suggested to Reed that he might want to rethink that aspect of his package. "I understand you are saying there are dangers in placing it out at the dish. We would intend that the indoor unit, if in fact the Merrimac package were to go outdoors, is trivial in simplicity and would not have to be located right on top of the TV. It could be mounted or installed next to the armchair or that sort of thing where a person could readjust the fine tuning when he needed to do so."

"We are still evaluating other sources. The thing that upsets me about the Merrimac package is that it is impossible to second source. In this industry we don't want to be hit by the kind of delivery delays that crippled other growing industries."

Well, there seems to be several indications here that perhaps Spacecoast was, as Reed suggests, 'premature' in their announcement; a great many delays they are presently blaming on an engineer with whom they have been associated (on an apparent consulting basis). "It is not as if we have cut off communication with the engineer...he is an academic guy, very talented, but he is having trouble with deadlines. So we are looking to find alternate sources for the parts...if he can get his design to work, great, it's fantastic. But, if he can't, we think there is a large market out there that the 'majors' are overlooking. I'm not worried about SA or Gardiner or Microdyne...I think we should all together be worried about the Japanese coming in here (with very low priced mass produced terminals)".

Perhaps a bigger concern of Spacecoast at the moment **should be** their working out the admitted bugs in **their** system. Completing the design certainly has first priority (after responding to the inquiries that are now flooding in and returning those checks that eager beavers are enclosing). Just how does all of this sort out?

Understand that the editorial digging we did was late in November. Given the month interval certain things can

change. Others cannot. As best we can determine, Spacecoast had an outside consulting type who had designed, **on paper**, a complete from scratch receiver that included an LNA. He apparently planned to use an HP chip-type '4 GHz gain block' which HP sources suggest to us is now working well in the 1.2 to 1.5 GHz region but is still a long ways (even as an experimental device) from 4 GHz. They also apparently **initially** planned to utilize their own microstrip technology to build the downconverter from 4 GHz to 70 MHz. According to Reed the consultant had never shared with Spacecoast any design information on the 70 MHz (i.f.) to baseband portions; if indeed he had it worked out even on paper. At some point the tentative decision was made to not attempt to go from no electronics manufacturing history straight into microstrip technology; but rather to buy outside the Merrimac DCV-2002 4 GHz input and 70 MHz output downconverter. Then it all fell apart; the engineer quit or was terminated or they got into some type of argument. But the mail out fliers were in the mill and gone; long before there was a working prototype of **either** design approach.

Reed notes "We really got caught with our pants down a little bit on this, with the engineer problem, but we are determined that we are on the right track and we are determined likewise to pursue it."

Spacecoast is not giving up but it may be considerably longer than Reed's optimistic "60 days" (from late November) before they get their act really together. The \$1200 kit version initially announced would work this way: "We'd supply all of the microwave portion completely built up". Does that mean the kit builder only builds 70 MHz down (since the Merrimac portion gets you to 70 MHz)? "No, we might have the kit builder start higher; such as with the local oscillators". As the separate report here notes the DCV-2002 requires a **pair** of LOs (being a double version 'machine'), both operating in the 700-800 MHz regions. The Spacecoast literature also notes that the buyer gets a 'feed' for his antenna. We wondered just what configuration that might be.

"Yes, we'll supply a feed but it is a trivial thing. What we intend to use for our feed is a buttonhook design; simply an open flange". Spacecoast also talks about having the ability to 'cool' the LNA (see November CSD, page P16 for a report on thermo-electric cooling) and Reed feels that if they utilize a buttonhook (simplistic feed that actually consists of a piece of waveguide slightly flared or not flared at all that is open towards the dish surface) that will make it possible for them to **later investigate** cooling.

MERRIMAC PART OF THE KEY

Reed points out that in the kit version the builder will probably be responsible for the LOs and the 70 MHz to baseband portion. How the LNA will be resolved is unclear. This suggests that the Spacecoast package may (and this is **our** conception) end up looking something like **diagram one** here. Reed may be suggesting that virtually everything through G could be located outdoors. While that is technically feasible it is **CSD's** feeling at this point in technology that the less you have outdoors the better for the time being.

The 'heart' of the system is the Merrimac unit. Just what is the status of the DCV series units at this point in time? We went to Merrimac to find out and Dan Brodow, Vice President of marketing told us "We are now looking at March first delivery for the first units. By the first of February we will be far enough along with the early production on this unit that we can **then accept orders** with a thirty day turn around between order receipt and shipping".

What did Brodow know about Spacecoast Research's interest in their unit? "My people tell me they called us and we sent them the brochures...however I don't know if we have had any serious conversations with them yet. As far as I know they have never gotten (any) samples from Merrimac". And if Spacecoast suddenly turned in an order for DCV-2002s on say December 1st? "They would get their first order around March 1st".

BOTTOM LINE?

We hope Spacecoast makes it. Somebody, in fact numerous somebodies, could do very well in this marketplace

THE MERRIMAC DOWNCONVERTERS

Manufacturer: Merrimac Industries, Inc., P. O. Box 986, W. Caldwell, N.J. 07006

Products: DCV-2000 810 MHz 2nd LO (+/- 1 part 10⁴ p/m stability) \$1350
DCV-2001 810 MHz 2nd LO (+/- 1 part 10⁶ p/m stability) \$1500
DCV-2002 no LO \$1150

RF Input: 3.7 to 4.2 GHz

Input Level: -60 to -30 dBm

Input Noise Figure: 13.5 dB (max)

Conversion Gain: +15 dB

First i.f. Center: 880 MHz (others available)

Standard Bandwidth: +/- 20 MHz at 1 dB; 30 MHz at 3 dB

Second i.f. Center: 70 MHz

First LO Range: 710 to 825 MHz (user supplies)

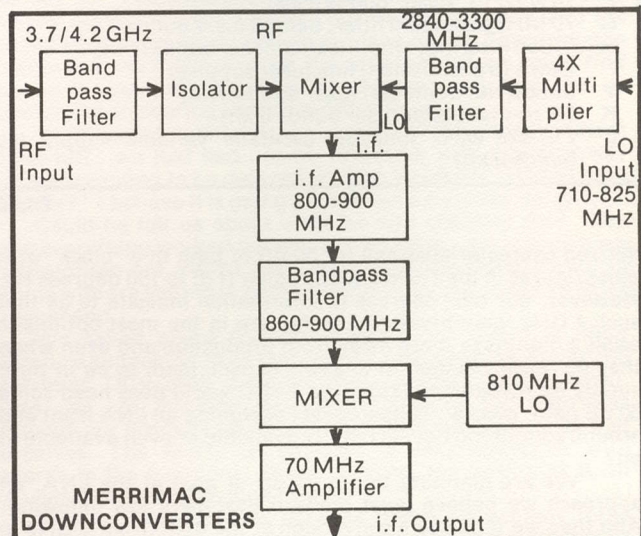
Second LO Range: 810 MHz (DCV-2000, DCV-2001)

LO Drive Level: +10 dBm

Power Requirements: +15 VDC, 300 ma.

Connectors: RF input (N female), LO input (SMA female), i.f. output (TNC/BNC)

Contact: Dan Brodow (201-575-1300)



right now if they had a quality, proven, properly de-bugged package on the market. Too many people are spending too much time chasing parts that can't be found and such time spent is time lost. As an interim measure, just having a full set of high quality boards would be a step in the right direction. **CSD** has talked with several people / firms that seem interested in doing just this, but for now no one is delivering. We'll keep you advised. In the interim, keep your money at home.

ACTIVE MIXER BOARD

The October (1979) issue of **CSD** carried a technical report on the Robert Coleman active GaAs-FET mixer plus VTO 8360 local oscillator source. Those who attended SPTS '79 had the opportunity to see Coleman describe his low cost, high performance front end which employs one or two stages of GaAs-FET LNA feeding the amplified 4 GHz signal directly into an 'active mixer' built around the HFET 1101 (HP) GaAs-FET. Coleman's approach is to reduce the 4 GHz gain requirements. By lowering the amount of gain required the system designer is able to spend less money on front end parts and simplify the system in the process.

The October report showed the circuit diagram for the 4 GHz to 70 MHz active mixer plus the Avantek VTO 8360 LO source. Shown here is the **actual circuit board** layout (real size)

in both positive and negative form to allow you to print directly from the magazine to make your own 4 GHz mixer/LO section. See the October issue report for the full schematic and parts listing.

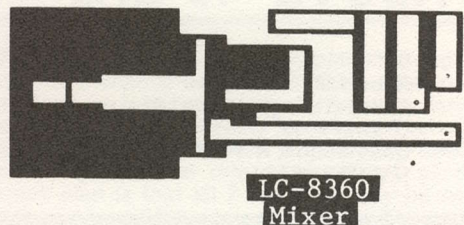
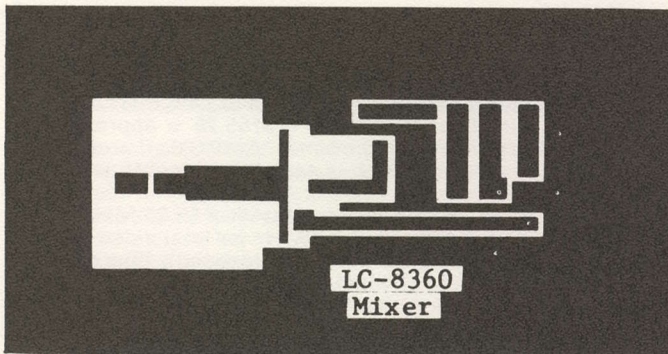
The circuit board shown here (LC 8360) is available directly from Robert Coleman (RFD 3, Box 58-A, Travelers Rest, S.C. 29690) printed on teflon Duroid board for \$25. Additionally, attendees at SPTS '80 in Miami in February will be able to see the completed unit and discuss its design and operation with Coleman.

In a related development in the active mixer area, at least one commercial equipment supplier has been working on a balanced active mixer and their results to date are instructional for those experimenting in this area. The **tentative conclusion** of this firm is that the GaAs-FET device (for single ended or devices for doubly balanced mixers) may **not** be the ideal transistor for the application. They report that because the GaAs-FET is such a linear device with a considerable dynamic range it is their current belief that a quality 4 GHz rated bi-polar such as the HXTR series of transistor may be more suited to this application. Any mixer needs to be driven into a non-linear range they point out and the GaAs-FET may indeed offer a low internal device noise figure but it requires very large amounts of drive (one source said "watts") for **efficient** mixer operation service. The HXTR device (commonly employed in the Howard Terminal LNA system) on the other hand will have a higher internal noise figure but because it is not as linear as the GaAs-FET and has a lower dynamic range it should produce more conversion-circuit-gain. Several people

COLEMAN TERMINAL UPDATE

are known to be working on experiments with the HXTR as an active mixer and perhaps some preliminary reports will be available by SPTS '80.

In the interim Coleman's HFET 1101 is producing excellent quality pictures as a single ended active mixer and one can only hope that if the HXTR bi-polar approach to active mixing is superior that even simpler (and lower cost) down conversion from 4 GHz to a suitable i.f. will follow.



THE COMPONENTS SCENE

FEEDHORN SOURCE

If you have been having good luck running down a parabolic antenna for your system but are having difficulty adjusting to a shortage of suitable feedhorns with the proper flare to match your parabolic antenna, here is a good source that produces a high quality horn at a reasonable price. **ECA** (P.O. Box 2029, Grove, Oklahoma 74344; Tony Bickel at 918-786-5349) has an extensive line of horns constructed to near-mil specs from brass (flange) and copper (the horn) which

end up in the standard CPR 229G flange plate. Price is \$78.50 in quantities from 1 to 24 and there is a ten percent price drop for 25 up. This is for U.S. or Canada or Mexico shipment via (UPS or) parcel post. ECA keeps an inventory of these horns in stock although your particular f/D may not be a stock item. You must know the focal length to diameter of your antenna (f/D) before you can order; ECA can supply standard designs in the 0.3 to 0.6 f/D region for the price quoted here. Several of the cable TV antenna firms utilize the ECA horn as part of OEM packaging and our **CSD** terminal has an ECA horn now into its third year of (troublefree) operation. ECA also has a good stock of RG-214/U, 1/2" and 7/8" cable plus appropriate (Prodelin at the moment) fittings in stock so if you get into a bind locating appropriate fittings, right angles, adaptors or whatever you might try this source.

1200 MHz HOWARD SECTIONS

One of the more difficult portions of the Howard Terminal to run down is the 1200 MHz bandpass filter and amplifier. The 1200 MHz segment of the **original** Howard Terminal receiver was built around modules which Tay Howard obtained from Paul Shuch at Microcomm in San Jose, California. At the time Shuch provided the modules he was contemplating offering them commercially and in fact numerous early references to the Howard 1200 MHz segments sent the reader to Shuch for these modules. Subsequently Shuch competed design for a full 4 GHz to baseband receiver which he licensed International Crystal Manufacturing Company (ICM) to manufacture. The current ICM receivers which you see advertised here and on

display at SPTS gatherings are largely Shuch designed receivers.

With Shuch not building the 1200 MHz modules where does that leave a builder who wishes to duplicate the Howard Terminal (manual) receiver? Well, the Howard Terminal Manual references the reader to the December 1975 issue of **HAM RADIO Magazine** in which Shuch described the same 1200 MHz region bandpass filter. Included in that description is a board layout for the bandpass filter. In the **Shuch RX-4200 User's Manual** (available for \$25 from Microcomm, 14908 Sandy Lane, San Jose, California 95124) Paul describes in great detail this segment of the (ICM) receiver and includes board layouts for the filter and amplifier portion. Shuch has also recently agreed to supply "as long as the demand is small or the supply does not run out" some of the variable capacitors required for that bandpass filter, directly, to home builders. However the variable capacitors are not as difficult to find as the boards themselves. Many people have simply taken the artwork from either the RX-4200 Manual or from the original Ham Radio article and have produced the filter (and/or amplifier) boards. **Lindsey Riddle** of New Orleans (5546 Bellaire Drive, New Orleans 70124) is one of those and while

Lindsey has no intention of going into the 1200 MHz board 'business' he has offered to make up **some** boards for people who are **really desperate** on this portion of the package.

The same **Ham Radio Magazine** in their October 1975 issue has an article covering the Shuch 1200 MHz amplifier. However as the Howard manual suggests, Taylor believes that a person building a receiver from the Manual can really forget the 1200 MHz amplifier portion as long as you use four stages (40 dB of gain) at 4 GHz as he has done with his bi-polar LNA package described in the manual. Shuch does not agree, and preaches 'balanced gain' split between the 4 GHz segment, the 1200 MHz segment and the 70 MHz segment. In actual fact, Howard's package without gain at 1200 MHz does work as does Shuch's with gain at 1200 MHz so both appear to have valid points.

Into all of this comes **International Crystal Manufacturing Co.** (attention Royden Freeland, 10 North Lee, Oklahoma City, OK 73102) which now offers to supply for \$160 the Shuch/ICM 1200 MHz receiver portion that includes both the bandpass filter and the 1200 MHz amplifier. This is a built-up, wired and tested price and ICM should be delivering at this time on this item.

THE WORLD ABOVE 10 GHz

by
Robert M. Richardson
Richcraft Engineering Ltd.
Drawer 1065
Chautauqua, N.Y. 14722
[716]753-2654

SUMMARY

Last month's episode described our serendipitous discovery that an FM/FM television video/audio signal transmitted on the 10 GHz band with an ordinary low-cost Microwave Associates' Gunnplexer module and \$7.00 Snow-Sled 25" parabolic reflector could be transmitted over a 2+ mile path and be received with a similar Gunnplexer/parabolic dish. The receiver's i.f. signal is then amplified by an ordinary windband TV preamp and then fed **directly into any** standard American/Canadian (NTSC) TV receiver (AM video/FM audio) which delivers "studio quality" video and audio **with absolutely no processing whatsoever.**

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GENERAL

Let us philosophise a moment on the reason why FM/FM video and audio transmissions and reception by AM/FM TV receivers had not been discovered and/or published during the last 1/2 century of television development. We have 2 probabilities:

1) Until quite recently it has been difficult to generate truly **linear** wideband FM video signals at VHF frequencies. Let's assume we desire to generate a video FM signal at 55.25 MHz (channel 2) with + and - 4.5 MHz deviation and a modulation index of 1; $9/55.25 =$ approximately 16% and that's a whole bunch. At 10 GHz it = only 1/10 of one percent, which is easy to accomplish with good linearity.

2) This is the most probable reason: a 55.25 MHz carrier AM modulated with a 4.5 MHz (or less) video signal is very easily filtered (vestigial sideband), thus reducing bandwidth per channel and increasing the number of channels for a given frequency spectrum. By filtering out the lower sideband of a video AM and audio FM signal the channel spacing now in standard use in the U.S. and Canada is 6 MHz rather than the 9 to 10 MHz (with guard band) that a non-filtered signal would require.

On the 10 GHz band, 500 MHz wide, spectrum availability is no problem at all so we may use the ultra simple FM/FM approach and provide a guard band by spacing each channel 12 MHz and using only **every other** channel when we heterodyne down to the VHF TV Channels.

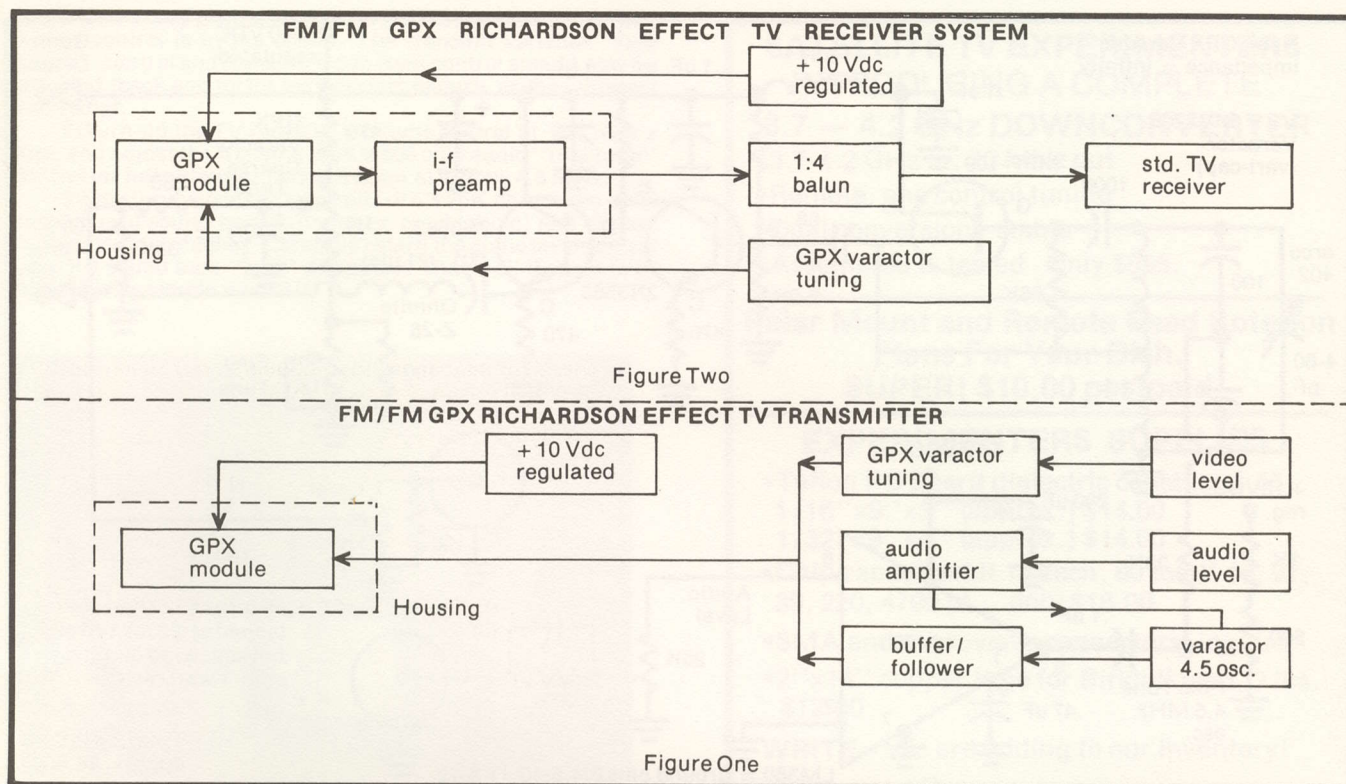
SYSTEM CONCEPT

The author's new book, "**The Gunnplexer Cookbook - A Microwave Primer**", (to be published now in the spring '80 by the Ham Radio Publishing Group, Greenville NH 03048), covers the standard approach to transmitting and receiving TV signals with the 10 GHz Gunnplexer modules; i.e., the received FM i.f. video is first amplified about 60 db and then converted (in a bridge discriminator) to AM video which is then amplified and AM modulates a low TV channel oscillator which feeds a standard TV receiver. The FM/FM techniques presented from this point on are all new and **have never been previously published.**

This month we will expand on the basic 'Richardson effect' FM/FM system and provide adequate data for the advanced microwave experimenter to build and test a system. Next month we will begin going into the nitty-gritty detailed instructions and schematics that should allow newcomers to the microwave bands to build their own operating Gunnplexer system for TV relay/computer data link/TV distribution that will easily handle 7 channels using a standard TV receiver as the tuneable i.f.

FIGURES 1 and 2

Let's run through last month's block diagrams illustrated in Figures 1 and 2. For this discussion we will assume that the **transmitting GPX**, for the channel 2 signal, is adjusted to



deliver exactly 10.179750 GHz output with a varactor voltage of +4.0 Vdc. This may be done quite simply using the methods presented in "The Gunnplexer Cookbook," or with a microwave digital frequency counter for those lucky enough to own or be able to borrow one (we are not that lucky). The receiving GPX module is similarly set to 10.235000 GHz output, also with its varactor voltage at +4.0 Vdc. The discerning reader will note that $10.235000 - 10.179750 = 55.25$ which **just happens** to be the video carrier frequency of TV channel 2. From now on we will leave off the kHz so we may deal in round numbers; i.e., $10.179750 = 10.180$ GHz.

The frequency of 10.235 GHz for the receiving GPX was selected for 2 reasons. **First** - it is 15 MHz below the standard amateur calling frequency of 10.250 GHz on this band and should be well out of anyone's way. Also, it is 15 MHz above 10.220 GHz which is one of the two possible frequencies when operating duplex with a calling station and both stations utilize a 30 MHz i.f. **Second** - if GPX TV relay/distribution systems proliferate, as well they may, 10.235 GHz offers a convenient marker/beacon frequency almost dead center in the amateur band. The unmodulated 10.235 GHz 10 milliwatt signals would serve admirably well for checking propagation conditions.

Also, with their 5 degree beamwidth, these **unmodulated** signals should cause no interference problems whatsoever to any other user of the 10 GHz spectrum. Actually, no one will even know they are there for all intents and purposes as this band is shared with pulse systems in the multi-100 kilowatt range.

Transmit GPX (GHz)	Receive GPX (GHz)	i.f. Output (MHz)	TV Channel No.
10.180	10.235	55	2
10.168	10.235	67	4
10.152	10.235	83	6
10.060	10.235	175	7
10.048	10.235	187	9
10.036	10.235	199	11
10.024	10.235	211	13

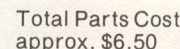
- TABLE 1 -

Table 1 illustrates a frequency plan that might be used to provide 7 TV channels on the 10 GHz amateur band, that would not cause interference to any known existing services. (An easy to obtain FCC radio amateur "Technician Class" license is all that is necessary to **legally operate** on this microwave band.) One interesting aspect of the author's frequency plan is that **all 7 channels** may be received by a **single** fixed-tuned GPX receiver. Only the TV receiver need be tuned to the desired channel as the receive GPX i.f. output is amplified by a broad band low-cost TV preamp before being fed directly to the TV set/distribution amplifier. An obvious application would be providing a small community (about 200 homes) across the lake from the author's home with 7 channels of satellite TV.

Figure 2 shows the i.f. preamp mounted in the GPX housing. This preamp may be any variety of wideband TV preamp covering the VHF channels such as the Radio Shack #15-1134 with 18 dB gain or the Winegard #7A2664-4 with 24 dB gain for longer coax runs from the GPX housing to the TV sets/distribution amplifiers. We recommend that well shielded RG59/U coax cable be used for all runs between the GPX housing and indoors on both the transmit and receive systems to avoid extraneous signal pickup. The receive system's GPX varactor tuning may be located in the GPX housing, but for initial tests by all means make it remote (indoors) fed with RG59/U coax until you become familiar with the **GPX Cookbook's** proportional temperature control and total system operation as climbing up a steep snow covered roof is no fun at all when channel 2 has drifted out of your TV set's fine tuning range. Proportional temperature control will maintain your GPX module temperature at set temperature plus or minus 1/100th degree F from -20 to +100 degrees F. At about \$4.00 parts cost it is well worth the investment.

TRANSMIT VIDEO/AUDIO DETAIL

Figure 3 is a schematic of the audio amplifier, 4.5 MHz audio subcarrier oscillator/buffer chain, and combined video/audio feeding the transmit GPX varactor. The video signal should be 1/2 to 1-1/2 volts peak to peak into a 75 - 100 ohm load. Its source is up to you. It may be taken from a TV receiver's video output, a TV camera, a video recorder, or more appropriately for satellite buffs out there in the hinterlands,



3) With the transmit audio control fully retarded and video level control 1/4 turn open, **slowly adjust** the varactor "coarse" tuning control for highest contrast picture, and then back-off a "hair". Since the TV receiver is your primary test

scope (and a very sophisticated one indeed), make sure its **fine tuning** control is in the center. The transmit varactor "fine tuning" control and transmit video level control should now be adjusted (back and forth) for a perfect picture, as they interact somewhat.

4) Turn-up the TV receiver's volume control til you hear a hiss, and adjust the transmit GPX's 500 ohm audio "fine tune" control **for full quieting**. This will occur at exactly 4.5 MHz.

5) Slowly advance the transmit GPX's 25K ohm audio level control until sound bars (with music or whistling) just appear on the TV video display. Carefully retard the audio level control until the sound bars "just" disappear. That is all there is to it. **Ridiculously simple wasn't it!**



Figure 5 is a photograph of the photographer photographing a TV receiver with his picture on the tube. The 10 GHz signal is only a REFLECTION from ACROSS Chautauqua Lake which is about 1-1/2 miles wide here. **More next month.**

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TECHNICAL CORRESPONDENCE AND NOTES

UNSIGNED DESPERATE NOTE

This is a desperate note from a frustrated man trying to find electronic components and parts for LNA's. I can't get copper plate or strap. I can't get nuttin! Somebody should

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please put out a packaged kit of **everything** a builder needs to assemble an LNA, and the receiver. Here in San Diego the parts houses have nuttin' and that includes people who know nuttin' about microwave components and associated equipment and parts. I have spent hundreds of dollars on phone calls, letters and so on and all I have for parts are some capacitors and a PC board from Robert Coleman. Please... somebody!

(someone in...)
San Diego, California

Yeh. It can be frustrating. That's one of the things pioneers have to put up with. If everything was neatly piled up in nice little boxes with clear instructions, we'd have millions rather than thousands of people participating. There is no doubt that there is a substantial market out there (we believe it is in the tens of thousands right now) for well done "kits" in this field. We have reason to believe that at least one substantial name in kit design and marketing is looking hard at this field. If you attend SPTS '80 in Miami, look carefully at the name tags. You might be surprised who is in attendance.

WANTS HELP IN CANADA

Looking at all of the material I have collected on the subject of satellite TV, I must admit that I am not an electronics engineer. The safest course would seem to be to assemble a kit from the Howard Terminal. Unfortunately I don't know of anyone who is offering such a kit. Can you please update me on when such a kit may come out? Or, do you know anyone (preferably in the eastern U.S.) who could build up a module at a time and ship it up to me here in New Brunswick? My primary concern is that lacking a solid background in electronics I may put something in backwards and blow out several hours work.

I intend to install my terminal inside of my geodesic dome (45 foot) that covers my year around swimming pool. At the moment it is technically not legal to have a private terminal and

certainly not one that tunes in U.S. satellites. I am hopeful that soon the government red tape will clear away. To me it is ironic that the same Canadian government that outlaws private terminals is out there donating 100 11/12 GHz private terminals for ANIK B to people living in northern rural areas. It is a classic case of do as I say, not as I do! I greatly enjoyed the first issue of CSD; congratulations and keep up the good work!

W.A.R.
New Brunswick

The suggestion that somebody should be making up the circuit boards for the Howard Terminal manuals is an excellent one. Taylor Howard has stated repeatedly that he is perfectly happy to see people duplicate his work (either for private use or for commercial re-sale and use). Tay is just that kind of guy, as is Robert Coleman with his innovative work. Somebody with time on their hands and a familiarity with building up modules might consider starting a little mini-production line in the den on evenings and weekends. We'd be happy to publicize it here and we are saving W.A.R.'s full name and address to forward to the first individual that wants to get into business for himself in this area. As this reader says, Canadian authorities are still pretty mixed up over how to handle this new technology so we think it might be a mistake to simply list his full name and address here openly at this time!

LOOKING FOR HARDWARE

The Australian Government has recently announced a go ahead for domestic satellites. Alldesign Services is an electronic design consultancy that specializes in closed circuit television systems. The recent government announcement has prompted us to examine the prospects of diversification into satellite broadcasting and reception. We are particularly interested in the current technology available for small domestic earth stations for reception of signals. Can you help us get in contact with firms that offer hardware in this field?

Eddie Jurkiewicz
Alldesign Services
54 Carrick Street
Woodlands, W. Australia
6018, Australia

Readers looking to make contact with an aggressive Australian/Pacific/SE Asia electronic firm with an interest in helping domestic satellite services develop there should contact Eddie Jurkiewicz directly.

WILLING HANDS

It has been a long time since I have become so fascinated and enthusiastic about a subject as I am with satellite

television. I would like to get involved as much as I can in this expanding technology. During my professional career I have designed many products in the TV field and have several patents on antennas. If there is any way I can help please let me know.

Keith T. Peterson
2835 Ninth Avenue North
Fort Dodge, Iowa 50501

Peterson has an attractive resume and a good history of innovation in television and antennas. There are many people out there looking for professional help in designing TVRO products and Anderson is available.

TECHNICAL NEWS NOTES

Direct to home satellite broadcasting received indirect support but **not approval** at conclusion of WARC '79. Frequency band 12.3 to 12.7 GHz was allocated worldwide but U.S. government sources see project at least ten years away here. Several additional conferences in 1983-1986 period are ahead before plans can stabilize.

COMSAT meanwhile still intends to submit proposal to FCC for their version of 2-6 channel 12 GHz direct to home broadcasting in February. Latest proposal calls for one channel to be utilized for 'national university of the air'; at-home college level courses.

Uplink frequencies for broadcasting satellite approved by WARC are 10.7 to 11.7 GHz for Europe, Africa and Asia plus 14-14.8 and 17.3-18.1 GHz; latter uplink bands will also be available for Western Hemisphere. In supplemental action 14 GHz region will be allowed for TV news crews to directly inter-connect to satellite systems for direct news feeds.

President Carter has promised NASA emergency infusion of \$300 million to get Space Shuttle program back on track. Meanwhile additional delays keep cropping up setting all shuttle schedules into cocked hat.

Spanish International Network's first UHF translator has gone into service in Denver area; 1,000 watt unit on channel 31. SIN plans additional satellite fed translators for Bakersfield, Austin, Tucson, Detroit, Washington and other cities shortly. SIN projects 90 such markets nationwide as being suitable for translators fed by satellite.

Present 3.7 to 4.2 GHz 'fixed' downlink band was expanded by WARC to add 3.4 to 3.6 GHz in most areas of world; **U.S. is exception** because of military radar system operating there. Russians have been using frequencies below 3.7 GHz for some years.

Scientific Atlanta is now shipping its own in-house manufactured LNA units and delivery of quantity 10 foot (3 meter) dishes also begins this month.

Launch of RCA SATCOM FIII went off with no major hitches: bird is now in flight check out mode and when completed in February or early March most existing cable services will switch to FIII from FI. A full run down of FIII and FI channel assignments will appear here in CSD as soon as they are formally announced.

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COOP'S COMMENT ON PROGRAMMING

AN UGLY TREND?

Elsewhere in this month's programming section appears a report that ESPN has raised their 'private' viewing fee to \$100; for a lifetime connection. ESPN is the all sports channel on transponder 7 which operates 24 hours per day through the weekends and around half of the time during the week. Earlier announcements about ESPN's rates had them charging someplace between \$1.40 and \$2.40 per viewing home for life. It turns out those are five-year-agreement rates for homes connected to ESPN **through** the local cable system. ESPN is willing to accept the private terminal viewer's \$100 and our report details what is involved.

The SPN mystery is more complex. SPN is the transponder 21 service which now operates 24 hours per day. It is given (as in free) to all cable systems who will carry the channel and it makes money by charging those who put programming on the service, plus, it accepts advertising. SPN goes into cable homes free of any charge to cable system operators. Logic suggests that SPN should also be a 'free' service for non-cable homes; i.e. direct reception home terminals. Now SPN is notifying home terminal operators that they are "not currently granting permission to home terminal viewers to watch their transponder".

The programmers who buy time via SPN to go into cable homes want the biggest possible audience for their programs. The advertisers who buy time on SPN also want the biggest possible audience. Why then is SPN not accepting private home terminal viewers?

The answer is complex. SPN circulated a form to all of their programmers last summer asking these programmers if they objected to having their programs distributed via SPN to (1) MDS systems, (2) MATV systems, or (3) private home terminals. Six of the present programmers on SPN responded that they did object to having their programs shown through SPN on MDS systems, MATV systems and to private terminals. Why? Because these programmers have entangled

copyright agreements whereby they are actually prohibited from distributing their programs directly to viewers who are not inter-connected to SPN via cable hookups. The world of copyright agreements is complex, often contradictory, and always confusing. When somebody produces a program, they often assign certain distribution rights to a second or third party. These distribution right assignments are usually assigned for monetary reasons; company 'X' agrees to put money up for company 'Y' to produce a program series, provided company 'X' gets a little spiff. The 'spiff' is that company 'X' gets the exclusive right to distribute the program to TV broadcast stations or to home viewers. Company 'Y', the program producer, retains the right to distribute the program to cable systems. Often the newer technologies such as MATV distribution (fed via satellite) or MDS distribution or direct-home-TVRO terminals are never mentioned or included in either firm's distribution agreement. And because it is unspecified, company 'Y', distributing the program via satellite and SPN to cable systems is precluded from granting that permission to SPN to serve MDS systems, MATV systems or private home terminals.

SPN has been accepting MATV system users but only after the MATV system has agreed in writing that it will 'turn off' SPN during those periods of the week when the six programs are being transmitted via SPN. MDS systems are in the same boat as private home terminals; their legal status as quasi-common-carrier broadcasters is under such a milky cloud these days that SPN and the SPN program suppliers simply don't want to mess with them.

SPN would like to be able to authorize home viewers to use their transponder 21 programs within the home. But SPN programmers are unable (or refuse) to allow home (private terminal) viewers. Once again the ugly head of copyright rears itself in the painful development of private home terminal viewing.

Is there a solution to this impasse? Currently Satellite Television Technology is one of the SPN programmers with our weekly 'Satellite Magazine' program each Thursday. **We grant** letters of permission for viewing our program on SPN and we suspect that many of the other SPN programming sources would do so as well if they had some way to handle the paperwork. We are working on this and we'll have more to say about it as we sort it all out.

RCA III DISAPPEARS

During a December 10 apogee kick motor firing RCA's FIII satellite disappeared. The kick motor firing either blew up the satellite, turned it over, or caused an electronic failure on board. RCA and NORAD will continue the search until around January 1. If not located and re-captured, the next launch date would be in 1981. **Some** of the FIII services planned may be fitted onto FI. Full report February and on **Satellite Magazine** January 3 and 10.

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PROGRAMMING



COOP'S SATELLITE DIGEST (Programming Edition) is produced monthly by Satellite Television Technology, P.O. Box G, Arcadia, Oklahoma 73007 (405-396-2574). CSD is available in two separate editions (Programming and Technology) or as a combined subscription. Subscription rates are \$30 per year for first class mail delivery within U.S.A. or Canada for either edition, or \$50 per year for the combined editions. Outside U.S.A. or Canada add \$25.00 per year for any subscription. All subscriptions to be paid in advance in U.S. funds drawn on a U.S. bank; no invoicing. Contents are Copyright 1980 © by Satellite Television Technology and any duplication or reproduction in any form without written permission is a violation of Federal Statute (17 USC 101 et seq.).

LICENSING CATV SYSTEMS

WHICH WAY IS UP?

The primary premium cable programmers on the satellite and some of the common carrier services offering up the nation's leading independent television stations say they cannot deal with the "private" or "individual" satellite home terminal viewer because either their program supplier agreements or the U.S. Copyright Law prohibits them from doing so. Other satellite delivered programming sources, such as ESPN, have reacted to what is apparently cable industry pressure and raised their 'private' viewer rates from miniscule to astronomical levels (see separate report this section of CSD).

On the surface it is beginning to look as if many of the satellite program services don't want private home terminal viewers on their books. Is that really what it is all about? And is there a way out of the quandry?

At SPTS '79 in August there was only a single premium service (HBO) which was in public refusing to accept private (home) terminal agreements. And only one common carrier indie service signal was also not accepting private agreement. Most observers predicted that given time HBO and Southern Satellite would see the handwriting on the wall and begin accepting private viewer contracts rather than simply refusing the service and encouraging by their refusal the piracy of their services.

Then in mid-fall the change came, only it went in an entirely different direction than had been forecast. SHOWTIME, which **had been** accepting private terminal viewers, joined the ranks of HBO; and Warner Cable for a number of reasons took KTVU off the market as an 'available indie' for hire. And then the champion of low cost satellite entertainment, ESPN, began advising interested private viewers that the rate was now \$100 rather than the nominal cable-TV-operator \$1.40 lifetime rate.

Some obvious pressure is at work here. Where is it coming from? The answer is 'the cable TV industry'.

Cable has a golden goose in the sky. With its own satellite(s), cable has programming simply not available to people any other way. Cable systems thrive and grow simply because they have optional, not-available-anyplace-else programming. **Cable systems want to keep it that way** and the larger cable operators see **home viewing** of satellite as a threat to **their** future growth. Just as broadcasters one day in the not too distant past attempted to keep their exclusive hold on viewers by getting the FCC to adopt complicated "cable signal carriage rules" intended to keep "foreign programs out of their service areas", cable firms are now showing their muscle to the satellite program suppliers and quietly letting these suppliers know that if they go out and sell their services "**directly**" to the public, without going through the cable "middleman", that the program suppliers are apt to lose their middlemen's bulk business.

Cable TV systems represent hundreds and thousands and in some instances hundreds of thousands of paying customers. It is not unusual for one cable conglomerate to add (or subtract) 200,000 or 400,000 or even 800,000 viewing homes to a satellite service with a single contract. Home viewers represent at most a few thousand dis-associated viewers with no such contractual power and even if the home viewing service grows dramatically in 1980 and 1981, it cannot approach the impact of a handful of large cable system group owners sitting down with a supplier and threatening to boycott his services. The handwriting is clearly on the wall.

THE WAY OUT?

You've seen the shops with signs that read 'Wholesale Only'. And there you stand outside their door with a pocketful of money, the desire for their merchandise, but no way they will sell it to you.

The answer may be that you become a wholesaler yourself. You might even make some money at it. Let's see how that might work.

There are two categories of satellite programmers of interest to us:

- 1) **The program service suppliers** who themselves contract for the transponder time (space) and for whom there are no formal FCC rules, regulations or provisions. HBO, SHOWTIME, The Movie Channel (formerly STAR Channel) plus Nickelodeon, ESPN, C-SPAN, Madison Square Garden Events, Trinity, SPN, PTL and CBN make up this group at the present time.
- 2) **The Common Carrier companies**, operating with on-file-at-the-FCC tariffs who largely bring to satellite off-air received broadcast signals. Southern Satellite brings up WTBS this way; Warner Cable Communications KTVU, United Video's WGN and Eastern Microwave's WOR complete this set.

The first group of suppliers can create their own rules, their own contracts, and conduct their business affairs pretty much as they see fit. They have only a handful of FCC (technical) rules to abide by and no real rules governing how they can or must conduct themselves in the marketplace. In effect, HBO can say to you "Yes, I want you as a customer", or alternately "no, I don't want you as a customer".

The second group of suppliers establish their own rules but they must get FCC approval for the way they offer their services to potential customers, how much they charge for their services, and how they treat their customers. In fact, if a

qualified customer comes to Southern Satellite asking for WTBS service and Southern refuses to deliver that service (or in the case of satellite reception, authorize use of that service) the 'qualified' customer has the right to go to the FCC and complain about Southern's handling of potential customers. Southern (and any other common carrier) runs the risk of losing their coveted FCC granted common carrier license if they (for example) refuse service to a qualified customer.

So how do you become a qualified customer? That's what this is all about. To explore, prior to Miami's SPTS '80 (where the subject will receive considerable panel discussion), just what an individual home viewer can do to get the program suppliers on the bird to sell him their service.

JOIN THEM

If you can't beat them, join them. Become a qualified buyer (at wholesale yet!) of the services they have to offer. It is not as if the various program suppliers don't want your money; they just don't want the hassle of having to keep special books for you when you are not part of the present cable game plan. Simply put, become a cable system. OK, what is a cable TV system?

Well, that depends upon whom you talk to. Way back in 1972 the FCC adopted some very complicated rules regarding what a cable system is or is not. And if you are one, what you can and cannot do. Let's go to the FCC rules to see how they define a cable television system at the Commission:

76.5 Definitions

[a]Cable Television System (or CATV system): Any facility, in whole or in part, receives directly, or indirectly over the air, and amplifies or otherwise modifies the signals transmitting programs broadcast by one or more television or radio stations and distributes such signals by wire or cable to subscribing members of the public who pay for such service, but such term shall not include [1] any facility that services fewer than 50 subscribers, or [2] any such facility that serves only the residents of one or more apartment dwellings under common ownership, control, or management and commercial premises located on the premises of such an apartment house.

Later "clarifications" of this ruling added condominiums (where 49 or fewer were in a common system) to the exempt list and trailer courts (where 50 or more trailers were hooked to a common system) became officially in FCC eyes "cable systems".

Well now, that seems clear enough. If you create a cable service and it does not have 50 or more subscribers, the FCC doesn't recognize you as a regulated cable system. Or, if you have 100 subscribers but "your cable service" only carries HBO, Nickelodeon and C-SPAN, they don't define you as a cable system simply because the services you are carrying do not include "one or more television or radio stations". On the surface, not being regulated by the FCC would seem to be a worthy goal. We'll return to that point shortly.

The FCC is not the only Washington agency that has an interest in defining cable systems. The Copyright Office is another agency with such an interest. For back in the fall of 1976 President Ford signed Public Law (PL) 94-553; a law that substantially revised and updated the 1909 Copyright Law and cable television played an important part in the final form of this new law. Until this law was signed cable television systems were "exempt" from paying copyright use fees for the television programs which they pick out of the air and deliver to cable customers. The Copyright Lobby was sufficiently influential to get the law written in such a way that now if a cable system operates it must pay at least a token fee to the Copyright Office on a semi-annual basis for the ongoing rights of "secondary transmission use" of broadcast television signals. Under the law, cable systems pay into a special fund collected and administered by the U.S. Copyright Office, and all persons, firms or others who create original-for-television programming are entitled to make a "claim" against that fund on an annual basis as "payment for their creativity". The language of PL 94-553 makes no distinctions as to system size. In the eyes of the Copyright Office, a cable system is exactly as the FCC defines it **only** there are no exemptions for size. In

DEALING WITH COPYRIGHT

If you intend to carry one or more broadcast television signals to one or more paying viewers, you must register your "cable television system" with the Copyright Office (Washington, D.C. 20559). There are no registration forms available, you simply write a letter that includes the following information:

- 1) The name of your cable system;
- 2) Tell whether you are an individual proprietor, a partnership, a corporation or other (explain other);
- 3) Give your full mailing address;
- 4) Name your community you will serve and if a portion of a community, so indicate. If only a rural area not incorporated, give a description of the area you will serve (i.e. "one square mile centered on the corners of Redbud and Harvest roads...").
- 5) List the call letters and city of license for all TV and FM and AM **broadcast** stations you intend to carry on your system.
- 6) Type or print your full name and your title, and sign the letter.

Headline the above letter "Cable Television Initial Notice of Identity and Signal Carriage Complement". Do **not** list non-broadcast signals you will carry (i.e. any satellite services not broadcast via regular broadcast stations).

There is a flat fee for all cable systems which gross less than \$80,000 per year. Chances are this will include you. **That fee is \$30 per year** and is paid on the basis of twice per year (they'll let you know about this when they respond to your initial identification letter). Copyright fees for cable systems that gross over \$40,000 per six months (\$80,000 per year) are quite complicated and you can worry about that when you get there!

There is one exemption to Copyright payments worth considering. If you carry **only** local (Grade B or better contour) off-air signals, but to that you add one or more of the **non-broadcast** satellite signals...and you make no direct charge for the 'MATV' service, you are exempt. An MATV system is defined as a 'master antenna television system' such as you find serving rooms in a motel or an apartment building. Note however that if you charge for the (MATV) service you are no longer exempt. Could you 'give away' the local broadcast signals and charge only for the satellite delivered **non-broadcast** signals and avoid the copyright folks? The answer is yes; the Copyright Act addresses "re-transmission of (**distant**) broadcast signals" and if you stick to local broadcast signals you can charge not for them but for the distant non-broadcast signals and avoid the copyright mess. But be sure every subscriber to your service signs a contract which clearly states that this is the case!

theory even a chap with a huge private TV antenna who hooks up a **single neighbor** for pay is a cable TV system for copyright definition purposes.

And that seems clear enough. You can hook up as many people as you wish for free, but hook up the first one for payment (of any kind) and the U.S. Copyright Office wants you to follow the rules of PL 94-553. We'll see what those rules are shortly.

So much for the federal definitions. Now what about state or local definitions? Some states have extensive cable "regulatory" acts on the books. New York State, for example, has a commission to "regulate" cable and a set of rules second only to the FCC rules. Most such states however follow the FCC's exemption process, excluding from regulation those systems with fewer than 50 subscribers. And state regulation is still the exception, not the rule (i.e. more states do not have cable regulation on a state level than do).

What about local regulations? This falls into two areas; incorporated areas and non-incorporated areas. The key word is "franchise". A franchise in most states is nothing more than the authority of the local governing body (city council, county commissioners) allowing the cable firm to "utilize the streets, alleys, byways (etc.) and other public easements to string cable and install amplifiers and other equipment". In other words, it is a permit to do business and such a "franchise" is often in lieu of a city business license. In a few states (Iowa for example) a "franchise" means more than that and it requires the approval of the local voters (referendum) in an incorporated community. You need a franchise (or permit) to use the **public** easements but you do **not** need any authority to utilize **private** easements other than the permission of the property owners who's land you will cross. This says that if you can avoid crossing over any streets and avoid using any existing utility poles to string your cable, you don't need city or county permission. You simply reach agreement with each landowner whose land you will cross and put in your cable and equipment. If you must cross a street or two there are several options available.

- 1) Ask for a "restricted franchise" from the city or county that specifies the exact service area you will cover, making note that your service is not intended for the whole community but rather is for 'local' distribution only, or,
- 2) Don't ask for a franchise; simply ask the city for a "street crossing permit" for a "closed circuit RF distribution system". In other words, don't make a big deal of it, keep it low key, and go to the appropriate city department asking for just specific street crossing permits where you require them to get from one block to another. If you **avoid** the use of phrases such as "pay cable" or "cable TV" or "premium television" chances are your permits will be granted without much hassle or attention.

In the latter case you are simply asking city or county permission to cross some public streets with a "coaxial cable" which you intend to "interconnect from your house (office, etc.) to several 'friends' who live nearby to you". What will you transmit through the coaxial cable? If they ask, explain that you are experimenting with satellite reception and you wish to share the reception with others. And be quick to explain that your system will be operating under the rules and regulations of the Federal Communications Commission and that it won't cause any interference with anybody else's electronic receiving equipment; it is merely a "receiving system".

Of course a person could get across a public street without a permit; in fact in some states such as Texas, unincorporated areas (i.e. within the county) are precluded from granting either (cable TV) franchises or street crossing permits. But there is one more hurdle to cross which makes the "street crossing permit" or "limited area franchise" almost mandatory; the utility company rules.

Most small systems will find that the least expensive and least troublesome method of getting from point 'A' (your

headend) to points 'B', 'C', etc. will be to attach your cables to the existing utility poles. Because of the growth of cable TV, utility firms now readily grant you such permission under annual rental agreements. For a fee (it varies from under \$2.00 in rural areas with REA poles to over \$12.00 - per pole per year - in other areas) they will allow you to attach your pole hardware and cable to their poles. BUT - in almost all instances they will not sit down and talk with you **until** you can demonstrate that you have all applicable local permits (easements, street crossing agreements) in hand. Again, keep it low key and act like your request is only for a small experimental project. Don't make the mistake of calling it a cable TV system; just yet!

Once you have the street crossing permits, easements where required and an agreement with the utility company, you are then ready to start stringing cable. But are there options to all of this?

Of course you could stay within one block (crossing no streets, or if you are in Texas cross streets as you wish in unincorporated areas) and lay your cable in such a way that it does not have to be on utility poles. You could bury your cable (Ditch-Witch and other rent-able pieces of equipment can bury several thousand feet of cable per day), again with permission of anyone who's land you cross. If you bury you have a new problem when crossing a street. There are two options:

- 1) Come back up above ground and use poles to cross,
- 2) Bore under the street.

Various classes of streets have different crossing-height requirements. A normal secondary street requires an 18 foot crossing height (your cable above the crown of the roadway). Interstate and other highways are often 21 feet while railroad crossings are a special case with 24 (and higher) clearances required. Boring under the street can be done with rented equipment but it is dangerous if you are inexperienced since you may well run into something under ground such as gas or sewer pipes. A better option might be to hire it done by a professional company engaging in such work, typically at a rate of \$3 to \$5 per foot. Again, crossing a street (even under) requires a street crossing permit in most areas.

WHERE ARE WE?

The FCC says you are exempt from their regulations if your "cable TV system" has fewer than 50 subscribers. **Indirectly**, they still regard you as a CATV system however. The Copyright Office says as soon as you connect one paying subscriber to your 'system' you are in their eyes a cable TV system. However their provisions only apply to your carriage of "broadcast TV signals" and if you **avoid** carrying satellite signals that **are broadcast signals** (KTVU, WGN, WOR, WTBS) and also avoid carrying any other (local) broadcast signals, they don't want to hear from you.

Some states regulate cable TV but apparently without exception you are exempt from their rules if you don't carry broadcast TV signals and in most such states you are exempt if you have fewer than 50 subscribers.

Local laws govern use of public easements for stringing cable (and other equipment) and most utility firms won't negotiate a pole-use-contract with you unless you have local permission to use these easements. By staying within one block (or in states such as Texas staying in unincorporated areas) you can avoid this hassle. In Texas (and possibly other states) the unincorporated areas require no easements and you can deal with the utility firms without an easement.

If you intend to have 50 or more subscribers at some point, that's another can of worms which we'll discuss in a future edition of CSD.

THE PROGRAM SUPPLIERS

The common carrier services (KTVU, WGN, WOR, WTBS) are **required** to provide service to you if you are willing to pay their rates and if you are a qualified user. You can be a qualified user if:

- 1) If you are a cable television system with paying customers, and if
- 2) Your cable system is operating in compliance with local regulations (if there are such regulations).

The independent signals available via satellite are 'tariffed' pretty much alike; in the small system category it

MAKE INTELLIGENT PROGRAMMING DECISIONS...

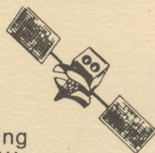
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The other services can take you or leave you alone; there are no rules which state that HBO (et al) **must** accept your order or request for service. There are extensive 'affiliate contracts' to be signed for all premium services. HBO's is by far the most extensive. Among other things it states:

- 1) The affiliate shall not offer another programming channel **packaged with HBO** for a premium service charge, unless you have the permission of HBO to do so.
- 2) The affiliate shall provide the earth receiving terminal, and must warrant in the contract that the earth station meets all applicable laws, regulations, procedures and orders for all bodies having jurisdiction over same.
- 3) The affiliate must have the capability of switching his HBO receiver to another satellite transponder in the event of failure of the primary transponder.
- 4) The affiliate warrants that it shall take all necessary, appropriate and reasonable precautions to prevent the reception of HBO premium programming by any party who is not an HBO subscriber.
- 5) HBO (et al) say you cannot supply HBO service to any establishment which "charges an admission fee, cover charge or 'minimum' ". Likewise, premium service programming cannot be displayed in any commercial or non-residential building including bars, restaurants, hotels, or fraternal organization or in any 'communal room' in a residential building such as the lobby or social room of an apartment house or college fraternity house.
- 6) Affiliates shall not permit and shall take all necessary, appropriate and reasonable precautions to prevent any use, copying or **taping** of any part of the HBO service.
- 7) Affiliates shall (at its own expense) select, purchase, install and maintain in good working order equipment which (to the extent reasonable for the state of the art) will ensure that the HBO service will be received only by HBO subscribers who pay for this (supplementary) service.
- 8) Affiliates must use their 'best efforts' to maintain a high quality signal for the HBO programming channel "at least equivalent to the transmission quality of the other programming provided by...the cable television system".

Premium programming wholesale rates vary slightly from firm to firm. For example:

HBO: They want a minimum of \$3.50 per month per premium service subscriber, and if the cable system gross for the service exceeds \$7.00 they want 50% of the gross up to \$8.50 per month and 30% of everything above \$8.50 per month. There are small discounts for large buyers starting at the 10,000 subscriber level.

SHOWTIME: They have a more flexible rate schedule that falls more or less in "competitive line" with HBO.

The Movie Channel (formerly STAR Channel): They have a flat fee of \$3.75 per month but have until this month 'thrown in' Nickelodeon as a bonus.

WHICH LEAVES YOU

There are several options open. If you elect to be a cable system with fewer than 50 subscribers:

- 1) You are free of FCC rules, but,
- 2) If you carry **any** broadcast signals (including the satellite signals from WOR, and/or WGN, and/or WTBS, and/or KTVU, and/or others that may be added such as Boston's WSBK) you must register with the Copy Office (see separate material in this report). And you must file semi-annual payments with the Copyright Office. If you carry **any** broadcast signals, the FCC rules state that you are supposed to also carry **all** local signals as well (i.e. those with a Grade B or better contour over your area).
- 3) The common carrier services are required to provide you service although it may be costly on a per-subscriber-basis per year until you reach the 50 subscriber or so

level (recall that there is a minimum charge of \$60 per year).

- 4) If you are doing these things, the chances are quite good that **at least one** of the premium programmers (The Movie Channel most likely) will deal with your 'very tiny' cable system on a contract basis.

Of course you'll have to obtain local permits as required but at least you don't need a TVRO license any longer since the FCC lifted that rule on October 18th.

If you elect to be a non-cable system (i.e. carry **no broadcast signals** at all), you can still carry ESPN, PTL, CBN, Trinity, Nickleodeon, one or perhaps more of the premium service channels (and others now coming on that are not broadcast signals) and avoid the FCC and the Copyright Office. However in so doing you may also cast some doubt in the minds of the premium programming suppliers unless you are willing to deal with The Movie Channel since they have been more flexible than others to date (accepting private residence viewers for example). A new non-cable cable system in Arkansas recently started up in a fair sized community in this manner, carrying 12 signals none of which are broadcast television!

There is no way that this brief synopsis could cover all of the problems, possibilities or contingencies of getting into the local re-distribution of satellite received signals. However this should provide you with a starting place and from feedback from your future reports will be created to attempt to answer your questions and plans.

FCC DEREGULATION PHASE II DISCUSSION SECTION 605

WHERE DO WE STAND?

In their decision to de-regulate receive-only earth terminals this past October 18th the Commission's actual discussion of Section 605 largely skirted the issue of how the regulatory body intends to implement Section 605 in the new regulatory scheme of things (see **CSD** for December, pages P2-P7). Subsequent to that open hearing the Commission's staff prepared a lengthy (19 page) document released on November 7th addressing the fine print language of the action of the 18th. As is often the case the Commission's printed release not only covered the action more extensively than the oral discussion, but it dealt with matters not even discussed in the actual session.

The purpose of such a document is to establish a record and close loopholes in the general theoretical approval of the full Commission. Matters such as the de-regulation of earth receive terminals often begin outside the Commission and are then initiated within the Commission by the Commissioners. At that point the staff picks up the ball and does the extensive digging required to prepare the matter for the Commission's agenda. After the item appears on the agenda the staff goes back to work preparing a detailed document on the item. This document is circulated (as a rule) to each Commissioner's office where legal and technical aides to each Commissioner go through the document. Refinements added, the document finally is released and it (as opposed to the oral discussion

before the full Commission) becomes the 'legal record' for the item.

The November 7th release (1) talks a great deal about Section 605, what it means, and where the Commission stands on this issue today. CSD has carefully reviewed the release and talked with several people at the Commission about the next step in the "605 clarification matter". Yes, that suggests there is (much) more to come on this issue.

In the November 7th release the Commission noted:

"Discussions related to whether or not Section 605 of the Communications Act...requires continued regulation of receive-only earth stations figured prominently in many of the comments received. Some parties argue that licensing is necessary for enforcement of Section 605 since threat of revocation of the station's license is an effective deterrent to violation. Those parties raise the specter of theft of signals and argue that this is a significant problem which any form of deregulation would tend to encourage.

"Some of the parties felt that more stringent regulation was called for...believing that additional information with regard to the programming which the individual operator had permission to receive would be helpful to enforce Section 605.

"Two additional disadvantages of optional licensing (related to Section 605) have been advanced...first that the option of revoking an operator's license must be maintained as a means of enforcement of Section 605...second that if licensing is made optional...the Commission must, at the very least, maintain a central list of all station locations and programming (which they are authorized to carry/receive)."

The Commission responded to these assertions with:

"We reject both of these arguments. We note (that Section 605) prohibits the unauthorized interception and disclosure of radio communications (and this law)...is applicable to domestic U.S. satellite transmissions except those that may be designated 'broadcast for the use of the general public'."

"It is well recognized that the purpose of Section 605 is to 'protect the integrity of the telecommunications network'. Domestic satellites are a part of the modern telecommunications network and all existing satellites have been designated as 'fixed' (satellites), **not broadcasting satellites**. Signals transmitted over existing domestic satellites are radio communications intended for a specific audience, not for the general public. Hence we conclude that the protections of Section 605 remain applicable to existing domestic satellite communications. We believe...that licensing is not an effective means of enforcing Section 605. Moreover, there is no evidence to suggest that the threat of revocation in itself is a significant deterrent. Civil remedies may accrue from violations of Section 605 and Federal Copyright Laws are applicable to much of the material carried via domestic satellite. (In addition), some provisions of the 1968 Omnibus Crime Control Act make the **mere interception** of protected communications a federal crime and may afford a special civil right of action. Furthermore, our other administrative remedies include imposition of forfeitures or issuance of cease and desist orders. Moreover...programming parties have the option of scrambling the signal transmitted and thus making unauthorized reception and use more difficult.

"We wish to emphasize that we are concerned about illegal interception of common carrier transmissions...we will address Section 605 in a proceeding on communications privacy which the staff is preparing..."

Well, for now that seems pretty clear. In the Commission's view **both** interception **and** disclosure of radio communications is prohibited. The Commission maintains that even signals 'broadcast for the use of the general public' (i.e. WGN, WOR, WTBS, and KTVU as now carried on SATCOM) are in fact 'protected' by Section 605 since the satellites

themselves are licensed as 'fixed' stations in the common carrier service; not as 'broadcast stations' (satellites). By that interpretation **any** transmissions passing through a station (i.e. **satellite**) licensed in the 'fixed' service are private in nature.

Fred Hopengarten and others have maintained that the **mere interception** was not illegal (see CSD for October 1979 and QST for January 1980; 'The New Frontier'). The Commission plainly disagrees. Hopengarten, as reported in the October CSD, seeks a formal FCC action on this point; he has requested that the Commission prosecute him and one of his (California) installations as a test of the Commission's authority here.

Section 605 has been little tested and not well understood from its origins. Perhaps it has been little understood primarily because the Commission itself has spent virtually no time either explaining it or enforcing what they **believe** it says. We noted that the Commission has asked 'the staff' to prepare a 'proceeding on communications privacy'. CSD finally ran down Russ Frisby, an 'attorney-advisor' with the Policy and Rules Division of the Commission who has been assigned to this proceeding. Frisby admits he is heading up this activity but suggest "...at the moment we are just looking into some privacy issues to try to make some determinations as to what proceedings we should initiate to look into..."

Frisby notes at this point he does not know whether this proceeding will end up being a Notice of (new) Proposed Rule Making, a 'Clarification' of the existing rules or a re-statement of Section 605 'policy'. "At this point we have been looking through a number of complaints that we have received". We asked if the areas being investigated by Frisby and his people were going to be 'limited to satellites'. "No, we are not going to be limited to satellites. One of the things we hope will come out of this will be a clear explanation of Section 605; but as I said we are just beginning..."

Have there been through the years any notable FCC actions regarding Section 605?

Frisby says "Not really. What we have done is issue a few notices; we had a 'Satellite Notice' (in the summer of 1978) and a 'MDS Notice' (in the winter of 1979). That has been the extent of our activities. In the late 60's the Commission had some correspondence with Lafayette Radio regarding a (subcarrier FM) receiver which they were making. However nothing ever came of that (in a legal sense) because Lafayette decided to drop the product voluntarily from the marketplace."

We pointed out that Lafayette may have been the largest marketer of such (FM) subcarrier receivers (at the time) but that since that decade old exchange of correspondence other firms have continued to manufacture and distribute such FM adaptors. Frisby notes "I think they are doing so out of ignorance of the rules or out of poor interpretation of what Section 605 means". In the Commission's view subcarrier FM transmissions (MUZAK, etc.) are protected under Section 605 and you are not supposed to be tuning in such transmissions without the permission of the operator of the system.

What about scanner radios? Here we have millions of radios widely marketed and expressly designed for the interception of 'private' (i.e. Section 605 protected) business, police, fire and other public safety and telecommunication transmissions. They are designed by intent to allow people to 'eavesdrop' (to use the Commission language).

Frisby notes "Again, that is something we really haven't dealt with. We did have occasion in the early 60's to issue a Public Notice reminding especially (FCC licensed) broadcasters that they couldn't listen into a police or fire or whatever transmission and then use it for broadcast purposes. But we have never really had to face that issue".

Apparently that early 60's Public Notice didn't make a very big impact; you can walk into every radio, television or newspaper newsroom in the country and find one or dozens of 'scanners' grinding away from channel to channel to give the newshawks a head start on getting their reporters to where the action is happening!

Will this 'proceeding' look into or address the reception of **non-U.S. satellites** by U.S. satellite terminal operators? We wondered about the Commission addressing the legal position

1)For those who might like to attempt to obtain a copy of the November 7 release it is captioned "In The Matter of Regulation of Domestic Receive-Only satellite earth stations; CC Docket no. 78-374", FCC 79-665 14953 from the Federal Communications Commission, 1919 M Street NW, Washington, D.C. 20554.

of individuals receiving transmissions from ANIK, or INTELSAT or the (Russian) STATIONAR birds now in the sky and 'visible' from many U.S. locations.

Frisby responded "It probably will not deal with that, although as I said we are just beginning to focus on the areas to be addressed here..."

The Commission in their November 7th formal written statement **did have** a couple of things to say about accessing non-U.S. satellites. The language does not give one an altogether 'clear' image of their present position (i.e. interpretation of their authority), perhaps because of semantic difficulties. For example, they noted:

"(The deregulation of receive only terminals, or optional licensing)...does not extend to INTELSAT facilities since additional regulatory responsibilities are imposed by the 1962 Communications Satellite Act on (such) receiving facilities... and we propose no changes whatsoever with regard to procedures for regulating those facilities."

"...any deregulation of receive-only earth stations does not imply permission to receive service from non-U.S. points. Such permission can be provided only after the discharge of our treaty obligations to INTELSAT. (Therefore), until such permission is granted any reception of non-U.S. signals is unauthorized and subject to the sanctions of Section 605...unless specifically authorized"

Apparently the Commission is telling U.S. receive terminal operators that they are not to tune in transmissions from non-U.S. domestic satellites (i.e. such as ANIK) nor from INTELSAT satellites (by name) without the written authority of INTELSAT. Not covered (because they overlooked it, or, on purpose) is reception from **not-domestic, not-INTELSAT** satellites such as the Russian STATIONAR series of satellites (as reported in the December **CSD**, Stationar-4 is now up and operating at 14 degrees west and puts a signal into the eastern 40% of the U.S. on 3845 MHz among other channels). Note that the Commission also re-affirmed the prohibition against U.S. DOMSATs providing service to **non-U.S. points** (such as Mexico, Canada, etc.). This prohibition has stood since the earliest users of DOMSATs emerged although it is hardly a matter for U.S. enforcement since any enforcement would have to be through the government of the country where the 'offense' is taking place.

Frisby notes "It is not likely we will deal with this in the projected proceeding; quite frankly we have enough problems at home!". The Commission did note in their November 7th release why they feel they cannot at this point in time deal with the reclassification of all U.S. domestic satellites operating in C band (3.7 to 4.2 GHz) from 'fixed' to 'broadcasting'.

"(Such a redesignation) is not feasible because the satellites operate in (a band) which is allocated to the Fixed Satellite Service in both the domestic and international tables of frequency allocations. Thus transmissions in this service must be between specified fixed points even though (as a matter of practicality) there is no limit in the number of such (fixed) receiving points. Therefore the prohibitions of Section 605 and Article 17 of the International Radio Regulations on the unauthorized reception and use of non-broadcasting radio transmissions are applicable. To permit the use of domestic satellites for reception by the general public, i.e. as broadcasting satellites, would have far-ranging domestic and international repercussions and is clearly beyond the scope of this proceeding."

WHICH SAYS...

...that if you wish to continue to operate your own private domestic satellite receive only terminal you should have the **written permission** of at least one program supplier on the bird(s). A listing of those services which grant such permission (in several cases without any fee being paid) appeared on page P6 of **CSD** for December. Satellite Television Technology continues to grant letters of permission for viewing of our weekly 'Satellite Magazine' program which is transmitted on Thursdays at 12 noon eastern on SPN transponder 21.

And this final note. In spite of the Commission's statement that "the staff is now working" on the 'privacy matter' and frequent statements by Commission personnel that such a document (under Frisby's direction) will be coming out 'soon',

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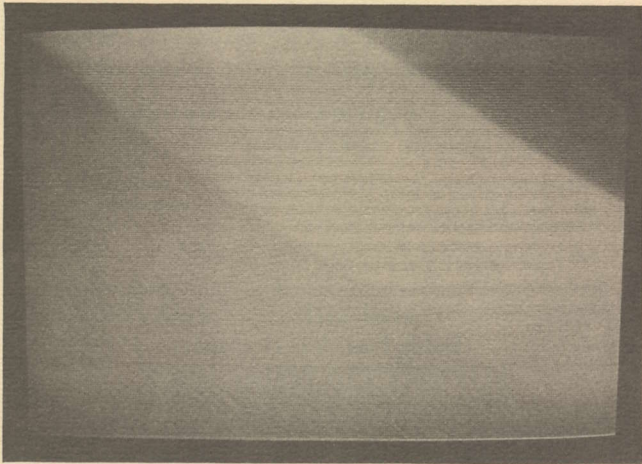
we got the distinct impression that such a document may well be in the mill through the end of the first quarter (i.e. end of March) if not in fact beyond. When it does 'ripen' for release, we'll again take up this issue here in **CSD**. In the interim, you now know as much as anybody does about this matter and more than most!

VIDEO PICTURES FROM SPACE MYSTERY

A MYSTERY?

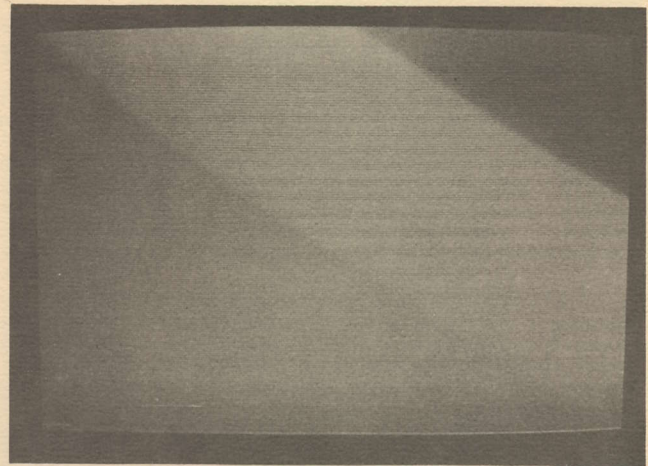
You never know what you will tune in on the satellite services. And sometimes what your eye sees is not what is there at all!

Case in point. Back in February of 1978 on RCA SATCOM FII (when this bird was the primary cable TV bird; cable services moved from FII to FI in June of 1978) RCA was doing a



OUT OF A DOZEN PHOTOS - 11 turned out this way. Depicting exactly what the eye saw [plus the diagonal effects of the camera's focal plane shutter].

great deal of 'experimenting' with various transponder loadin formats. One of the favorite test formats of that era involved turning on the 30 Hz energy dispersal waveform and running what appeared to be an unmodulated carrier through the transponder. To the eye it appeared as photo one here; a blank (grey) screen that filled the upper approximately 80% of the CRT with a clearly defined thick black band at the bottom of the CRT display.



HERE IS WHAT THE EYE SAW - a grey screen, no modulation evident, filling the upper approximately 80% of the screen.

In photos one and two here we see what it looked like to the eye. The upper left to lower right diagonal shading is a result of the 35 mm camera's focal plane shutter apparatus; to the eye the screen display was an even shade of grey from left to right and from top down to the black display at the base.

During one such testing sequence a 35 mm camera was set up and a series (approximately a dozen) of black and white photos were taken. For the uninitiated, you can take fairly high



BUT ONE PHOTO DISPLAYED WHAT THE EYE DID NOT SEE - this unexplained video that sill has people guessing as to what it is and why it showed up in the photo when the eye saw nothing. Perhaps this is the ultimate 'scrambling' system!

quality black and white or color photos off of the CRT by following these steps:

- 1) With a 35 mm camera, having adjustable F stop and speed controls,
- 2) Set the speed to 1/25th or 1/30th of a second (to correspond to the frame rate of 30 per second),
- 3) Adjust the monitor display for a normal display, slightly harsher contrast than you might normally adjust for viewing (but just slightly),
- 4) Hold the camera very steady, or mount it on a tripod and get in as close as you can and still focus the full CRT display in the viewfinder,
- 5) Set the aperture to f4 through f5.6 if you are utilizing Tri-X (ASA 400) 'fast' black and white film (f2.5 through f5 for slower color films),

and take your picture. In the case in point this is exactly what was being done; the non-video display was up on transponder 16 and the camera was manually operated for about a dozen shots of the seemingly uninteresting 80%-of-screen grey display you see.

Then the film was developed and much to everyone's surprise one of the photos developed and printed did **not** look like the display the eye(s) had seen. In fact it looked like nothing any of the observers had noticed at the time, prior to the event or subsequent to the event. See photo three here.

Several dozen people including engineers at RCA have viewed this photograph. The roll of film in question was developed and printed by a custom developing house where CSD (CATJ) photos have been handled for years. The individual doing the work was the same individual that had been doing the work all of those years. The image you see on the print is an exact replica of the image seen on the negative. This particular shot out of a group of 12 was number 8 and those immediately ahead of it and immediately after it are 'normal' in respect to showing the same 80%-of-screen grey display which the eye saw.

RCA people who have been shown the photograph (at the

Vernon Valley uplink site) have offered absolutely no explanations. Western Union engineers at the WU Vernon Valley uplink site similarly have had no explanations. The exact date and time of the photographic sequence was not recorded since there appeared to be nothing **that unusual** about the display. The 80%-of-screen grey pattern had been seen many dates prior to the photograph session and was seen many dates thereafter (although subsequent attempts to recapture the same effect when the display was again seen resulted in nothing but additional photos of the 'blank' screen).

Was RCA transmitting one frame of video alternating with multiple frames of no video? Was it possible for the camera to catch in 1/30th of a second what the eye could not see?

What is the video portrayed? There have been as many suggestions as there have been people who have up to now seen the photo. The consensus is that we are looking at some type of aerial photo, either still or live, and the background area is the ground perhaps far below. The light streaks have been guessed to be water or roads. What are the clouded figures in the foreground? The best (or most consistent) guesses are that we are seeing a parachute jump; the lower center light colored dome array looks very much like the top of a parachute and since it is apparently further away than the others (except for a pair of similar objects on the right hand edge) it may be assumed to be more in focus than the two immediately in the center. The two center objects? Possibly two parachutists (just right of center one thinks one sees legs and even boots hanging down from the vertical object).

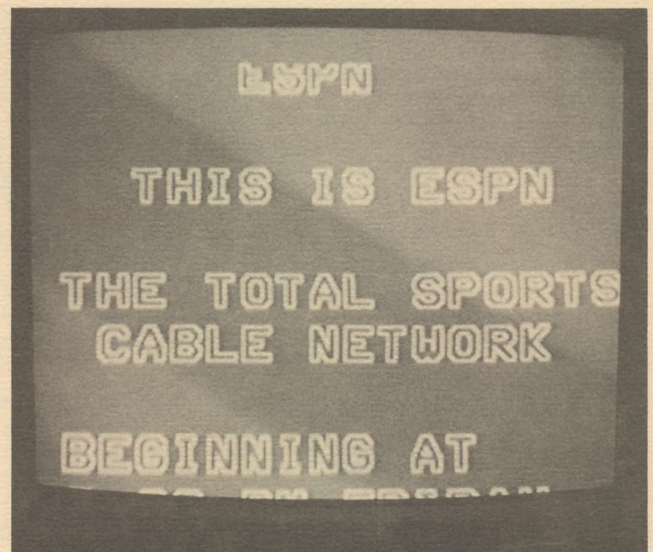
Was someone experimenting with the transmission of video information at a slow data rate (i.e. only for a portion of a second) within a carrier that was otherwise unmodulated? Would a camera that shot 30 photos per second have caught additional frames of the 'hidden video'?

The mystery continues to this day. We thought you'd like to see that sometimes what your eye sees on the CRT is not what is there afterall!

PROGRAMMING PERMISSION & LICENSING

WHAT HAPPENED TO ESPN?

ESPN (Entertainment and Sports Programming Network) began service to the cable industry (and others) via RCA Satcom F1 this past September 7th on transponder 7. The reaction from the cable industry has been highly favorable with as many as 4,000,000 homes reported now receiving the ESPN service. This particular programming service is being marketed as a low cost programming service to the cable operators with 18-20 hours per day of operation during weekdays and 24 hour operation on weekends. As reported in some detail in the October issue of **CSD**, the service is largely sporting events rather skillfully arranged throughout the day and night so that virtually anytime a viewer gets the yen to watch a sporting event ESPN has one available. The service carries advertising and is designed to cost the cable service very little.



CSD and other publications have been quoting the ESPN rate at \$1.40 per year, to anybody, anywhere. We have been in error, or at least recent events now make that information in error. ESPN's **base rate** to cable operators is \$2.40 per cable subscriber spread over a time payment schedule. There are discounts for large cable operators and the rates do in fact reach \$1.40 per cable home when maximum discounts for large cable operators are reached. However, ESPN now states that the rate for a **single residence** is \$100 for life. The cable rate of \$2.40 (sliding down to \$1.40) is for a five year term, not life as reported earlier.

There is a substantial difference between \$1.40 (or \$2.40) and \$100, and CSD contacted ESPN to find out why. Jeff James attempted to answer the questions for us.

"Basically, we had never set a policy on a private earth station or terminal before; we were simply dealing with the cable systems where the (base) rate is \$2.40 per subscriber for five years. Then we were approached by some private users who wanted to carry ESPN and we just sat down one day and said 'OK, what are we going to do?' and someone popped up with the idea of \$100 for life. And we ran with that. I think we only have one or two private users who are actually under contract (at this rate)."

ESPN has no formal application form; interested people simply write ESPN a letter stating they would like to carry the service in their homes (ESPN, ESPN Plaza, Bristol, Ct 06010) and ESPN responds with a letter which states that you have the authority to tune in their service. Attached to the letter is an group of addenda which states that if you do initiate reception of ESPN that automatically indicates compliance with the applicable rules (of the FCC and the satellite operator).

Will the \$100 rate stick? We asked James how ESPN handled the argument that the individual home terminal operator has invested his own (substantial) money in an earth terminal and like the cable operator no cost for the reception of the service is being borne by the programmer. Many private terminal operators feel that as long as they are providing the equipment, they should be entitled to the 'wholesale' rate, just as the cable operators pay.

James response. "I think these people have to recognize that wholesale buyers deal in bulk in virtually any commodity bought and sold in commerce today. If you go and buy an apple from a store, it is going to charge you a dime. If you buy 20,000 apples they might only charge you a nickel. Private operators have to realize that a cable operator is coming at us with 10, 15, or 20,000 people. Even within the cable community, if TelePrompTer comes at us with 1,000,000 subs, they are going to get a better discount than someone who comes to us with 500 subscribers."

What about STARSCAN's National Registration Bureau that is acting as a 'bulk buyer' representing hundreds or ultimately tens of thousands of individual home terminal operators? Has ESPN been negotiating with the National Registration Bureau/STARSCAN to work out an agreement where NRB buys in bulk and then redistributes the permission for ESPN on a terminal by terminal basis?

James again. "I'm not sure how we will handle that but my feeling at the moment is that the rate will be the \$100 fee for NRB not the lower cable bulk rates".

ESPN's success in the cable marketplace has brought them to the attention of other categories of 'bulk distributors'. Hotels, motels and others of that ilk are a perfect example of the type of potential user now clamoring for contracts and service from ESPN. James. "The first question we ask them is if they have a cable franchise. The answer is obvious; they do not have a cable franchise."

To ESPN the 'holding of a franchise' is a key 'password' for qualification as a 'bulk buyer'. What about areas such as Texas where in unincorporated regions there are no such things as franchises? "That's a tough situation. We ask the fellow how many subscribers he has, or is likely to have if his system is new. If he says only one I find it hard to think he will be very profitable and he is really an individual home viewer."

Suppose he has a few hundred or otherwise acts like he is in a 'growth mode'? "I'll probably treat him like any other cable operator; at least until we find out differently." There is no magic number; the cable operator has to act like a cable operator to be qualified for the 'bulk rate'.

The next marketing decision hurdle ahead for ESPN is the hotel market. Locations in Nevada, Las Vegas in particular, have swamped ESPN with requests for service. "These places want to be able to add ESPN's 24 hour sports schedule to their MATV systems." How will ESPN handle these new potential clients; as individuals or as (small) CATV systems?

"We haven't established a hotel rate yet but what we will probably do is set it up like a cable company and charge between \$2.00 and \$3.00 per room (for five years) because

PRIVATE USER CONDITIONS & OBLIGATIONS [for ESPN]

1. This Agreement and the obligations imposed hereby is and shall be governed by, subject to, and interpreted in accordance with all terms, rules, regulations, charges, practices and conditions of F.C.C. Tariff #1 including supplements or amendments thereto. Private user and ESPN shall comply with all provisions of that tariff, which is incorporated herein by reference and shall be a part of this Agreement.

2. Private user agrees to file with the Federal Communications Commission any necessary application and receive the necessary authorizations for the service from the Federal Communications Commission prior to the implementation of said service to the private user.

3. Private user will not charge admission or in any way exchange for value ESPN programming.

4. Private user agrees not to copy, record, reproduce, or duplicate any ESPN program or part thereof. Private user further agrees not to use any copy, record, reproduction, or duplicate of an ESPN program or part thereof without ESPN's prior written authorization. Private user will take all other reasonable and practical security measures to prevent the unauthorized copying, recording, reproduction duplication or use of any ESPN programming by others.

5. ESPN shall not be responsible for interruptions or discontinuances of satellite service due to factors beyond ESPN's control.

6. ESPN retains the right to terminate this Agreement in the event that the private user fails to abide by the terms of this Agreement.

If you should opt to become a 'private user' of ESPN, here are the terms you will agree to abide by.

most of the hotels we are hearing from have upwards of 300 rooms. They are not unlike a small cable company and if you get a chainlike Ramada Inns you get tens of thousands of room ultimately."

ESPN has also verified to CSD that they will have not only transponder 7 on SATCOM FIII (when it becomes activated) but that they will be utilizing transponder 7 on SATCOM FI as well. What are their plans for the second transponder on the second bird? Initially the FI transponder will be used to ship sport programming data back to their Bristol, Ct. uplink site where it will be taped or re-shot out on transponder 7 on FIII for direct viewing. In effect, it will become their "remote coverage feedback transponder". Ultimately? It is possible as more and more cable systems become equipped for both satellites that the FI transponder 7 may be utilized for split time zone feeds or even multiple feeds (i.e. ESPN x 2). In effect, it is both room for growth and an insurance policy against the future needs of ESPN.

As a marketing tool for those who are out looking for customers for earth terminals this 'clarification of policy' does two things. It puts ESPN (because of the rate structure) into the forbidden fruit region for most viewers. There is little doubt that \$100 for a lifetime fee is something of a bargain (if both the viewer's life and ESPN's life stretches far enough) but it is a gamble requiring up front payment. However, on the positive side the likelihood that ESPN will be actively courting motel and hotel viewers suggests that readers of CSD engaged in creating markets for terminals have another powerful channel to offer to a segment of the marketplace barely scratched to date; motels, hotels and one would suppose other multiple dwelling units. If ESPN does follow through and establish five year period rates in the \$2.00 to \$3.00 (per room/residence) region, it makes the service an exciting one indeed.

THE LAST UPDATE

The Satellite Private Terminal Seminar for February's 5, 6 and 7 in Miami, Florida is in its' final high gear stages. The

pre-registration trend in mid-December indicates that probably no fewer than 750 interested people will be on hand and the capacity of the hall (around 1,000) may just as easily be reached as late registrants pour in.

Of particular interest will be many new antenna, LNA and receiver suppliers who are planning to introduce new hardware at SPTS '80. Those who attended SPTS '79 will recall that at the Oklahoma City seminar there were a couple of joint efforts proclaiming that "the \$4,000 earth terminal" was available. We believe that sharp students of pricing may find \$2,500 earth terminal packages (using antennas, LNA designs and receivers from three **different** sources) possible at SPTS '80. **However**, low ball pricing may not be the best news of SPTS '80. Many talented suppliers are asking themselves just how much of the currently required hardware one can really take out of magic boxes and still produce quality pictures. It is our pre-SPTS '80/Miami **opinion** that while perhaps less and less expensive equipment is becoming available for the "buy it and install it" set that there may be some serious questions asked about whether cheaper hardware is necessarily the best direction to go in a marketplace that is still so new that the potential for installed systems at higher ticket prices has not been yet satisfied.

The Miami location presents some problems not present in Oklahoma at SPTS '79; the footprints from many of the domestic satellites are considerably weaker in South Florida than they are in the majority of the rest of the country and the cable industry cut over to FILL is not likely to occur until after February's gathering. This means that many antennas (smaller than 16 feet) will be strained to (and perhaps beyond) their capacities to produce noise free signals in this region on FI. (The likelihood that after the FILL cut over this region **will be able** to utilize 12 foot dishes is good but if FI is still in use during the seminar that won't help much!). Therefore attendees can expect to see many of the antennas on hand either looking at stronger satellites (WESTAR in particular) or providing living proof that a ten foot (or even 12 foot) is not a 'large enough antenna' **all over** the country.

Considerable seminar time will be devoted to the interconnection world; sessions on MDS and low cost cable re-distribution systems will be on the program, as well as a special session for the Caribbean, Central and South American

SPTS 80 MIAMI

attendees (in Spanish and English) describing 10 to 100 watt UHF (TV band) transmission systems (with converters) which can be operated in many countries as low-frequency-MDS approach systems.

Through an arrangement with **Instant Replay**, the full program (consisting of more than 25 separate lecture sessions) will be videotaped and for those who are unable to attend or who would like videotape copies of some (or all) of the sessions, they will be available through Instant Replay at the seminar and directly afterwards on BETA and VHS formats (as well as 3/4 inch). In the exhibit area Instant Replay will have two separate 'video theaters' set up and operating during both the exhibit hall hours and between sessions during lunch and each morning. In these video theaters will run approximately 15 separate videotape features depicting how the satellite system operates, what hardware looks like and how it all goes together. These tapes, from the STT 'library', will give attendees the opportunity to 'visit' the Howard Terminal, the Coleman Terminal, Oliver Swan's Arizona location where the Spherical Antenna was developed and much more.

SECOND CUT - SPTS '80 MIAMI PROGRAM SCHEDULE

Here is the Miami program schedule as it shapes up late in December. A full printed program with considerable detailed explanation for each session will be included in your SPTS '80 Miami Program Packet which you will be able to pick up at the registration desk at Bayfront Park Auditorium between 2 PM and 6 PM on February 4th or after 8 AM on February 5th.

Time	Tuesday, February 5th		Wednesday, February 6th		Thursday, February 7th	
	Main Hall	Shuch Hall	Main Hall	Shuch Hall	Main Hall	Shuch Hall
8AM-8:50		Videotape		Videotape		Videotape
9AM-9:50	Introduction to TVRO Language	Spanish-Behar	Taylor Howard	Shuch #5	LNA Technology	Spanish-Behar
10-10:50	What FCC De-regulation Means	Shuch #1	Robert Coleman	Shuch #6	What's On The Birds?	Shuch #10 (Videotaped)
11-11:50	Getting Programmer Permission	Shuch #2	Copyright Status	Shuch #7	12 GHz Satellites When and Where?	Shuch #11 (Videotaped)
12N-1:45 PM	Exhibit Hall Open		Exhibit Hall Open		Exhibit Hall Open	
12:30-1:30		Videotape		Videotape		Videotape
2PM-2:50	Distributing TVRO Gear	Shuch #3	To Be Announced	Shuch #8	Low Cost Antenna Technology	Shuch #12 (Videotaped)
3PM-3:50	Marketing Experience To Date	Shuch #4	MDS/Cable Interconnect	Shuch #9	The Year Ahead	
4PM-6PM	Exhibit Hall Open		Exhibit Hall Open			
4:30-8:PM				Videotapes		
6PM-8PM			Exhibit Hall Open			

Here are the highlights of the February 5-7 SPTS in Miami as they shape up late in December:

- 1) **\$1800 tuneable receiver** - ready to plug in and turn on. A brand new private terminal receiver to be shown for the first time in Miami.
- 2) **\$850 up antennas** - a large selection of new antennas including a fiberglass ten footer at a new low price!
- 3) **Everything At The Antenna** - an innovative feedhorn with LNA and the complete receiver built into the horn! You run RG-58/9 coaxial cable to the TV set inside and 'everything is at the antenna but the picture'. Price range? **\$1800 wired and tested!**
- 4) **Private Satellite Users Net** - a bold plan whereby home terminal operators will form their own network and rent transponder time as a group!

Time is running out and space is disappearing fast. Have you registered for SPTS '80 Miami yet?

All attendees will have the option of receiving a copy of the current editions of the Howard Terminal Manual, The Coleman Terminal Manual and the Swan Spherical Antenna Manual as a part of their registration fee; or turning one or all three back in for a 'credit'. The Coleman Terminal Manual is currently undergoing an extensive updating and if everything works out correctly the substantially revised Coleman Manual will be first available at SPTS '80.

San Jose City College's H. Paul Shuch will once again be on hand to conduct his now famous 'mini-symposium' on satellite system engineering and technology and there should be plenty of seating this time for Paul!

SPTS '80/Miami promises to bring together the very latest in low cost satellite hardware, the innovators who have created this hardware and the hundreds of people from throughout the Western Hemisphere who are in a position to best put this hardware out into the field and into good use. Returning will be Taylor Howard, Robert Coleman and Oliver Swan; all of whom have made substantial progress on their various approaches to low cost hardware technology **since we last met** at SPTS '79. In particular, Coleman and Howard have combined their talents to produce a totally new state of the art system that marries Coleman's GaAs-FET front end and his GaAs-FET active mixer (with Avantek VTO 8360 LO) to a new Howard created 70 MHz i.f. strip followed by the latest single-board (Howard plus Coleman created) 70 MHz to baseband demodulator system.

All of the elements will be on hand to send you home filled with hundreds of new ideas and concepts about the rapid development of low cost satellite receiving hardware and systems. **Pre-registration is mandatory** and you may either utilize the registration card found inside of this issue or contact: **Susan Cooper at SPTS '80, P. O. Box G, Arcadia, Oklahoma 73007 [405-396-2574].**

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SATELLITE POTPOURRI

MORE CANADIAN NOTES

The Canadian press continues to be active with reports on the growing number of 'illegal' satellite receive terminals now operating; especially in that country's far northern regions. The following report has been edited from an article appearing in **Maclean's** this past October, a Canadian general circulation magazine. Again we explain to **CSD** readers that this is not technical material but rather it was written by a layman for consumption by other laymen. However because of the nature of the report it provides keen insight into the building pressures in Canada to somehow force the Canadian government to work out an accommodation with the U.S. government so that Canadian viewing of U.S. DOMSAT birds can be done legally.

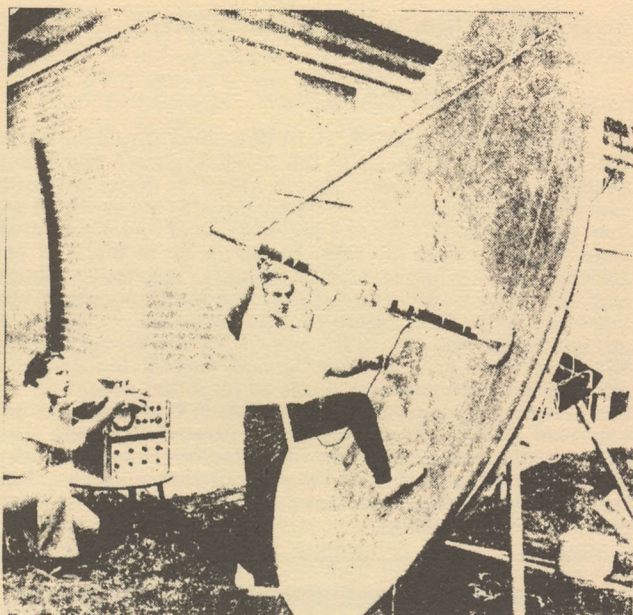
For years Iris Bowen and her neighbors in Faro in the central Yukon suffered through the long northern winter with only the help of the CBC's Northern Service and the annual Ice Worm Squirm winter carnival. Then last year an outfit called Canadian Satellite Systems knocked on the door and said she could sign up for three extra channels, channels that could get her "Jaws", "High Anxiety" and Hollywood specials long before they ever got to television in the South. Iris Bowen signed up, and so did 400 of her 2,000 fellow Faraites.

That's how it is all across Canada's North - aluminum dish antennas - sprouting like tin mushrooms on community-centre roofs and in backyards. Aimed heavenward they pluck from an RCA satellite 22,000 miles above earth the signals that were intended for U.S. cable networks and their subscribers. In putting in the dish systems, the 70-odd entrepreneurs responsible have crystallized the debate surrounding an entire area of highly sophisticated, little understood technology. What they have begun represents what outgoing chairman of the Canadian Radio-television and Telecommunications Commission (CRTC) Pierre Camu terms, "a revolution as fundamental as the one television created for audiences more than 25 years ago."

The problem is, though, that those satellite dishes that are keeping northerners so happy are illegal. The system owners have a letter from the federal department of communications (DOC) saying so. But they also have copies of a CRTC policy paper indicating agreement with their actions in principle. Understandably, they are confused.

At issue is much more than the question of 200,000 Canadians now under-served by southern television signals. No one inside government or out questions the allegation that northerners are getting a raw television deal compared to their southern cousins. But the northern earth-receiving stations cannot be licensed now because they are in violation of a 1972 "exchange of letters" between the U.S. and Canada that stated that Canadians could not pull U.S. television signals off U.S. satellites and vice versa. (So far the U.S. has not considered the unpaid use of its signals widespread enough for concern.)

Given the DOC admission that an inequitable situation exists, throwing the pirates in jail would be political



TWO LEADING CANADIAN SATELLITE BUFFS - David Brough (left) is best known for network of 1 to 10 watt VHF band rebroadcasting stations fed via tape from southern Canada (and now satellite) while Jan Spisar (right) was one of the engineering geniuses behind Canadian cable manufacturer Triple Crown Electronics before he became a satellite system designer earlier this year. Spisar is highly recommend for working out satellite hardware design problems and can be reached at [416]677-4314. Brough has an unlisted telephone number[!].

anathema, and jamming signals already in the air would make no more sense. Current DOC thinking appears to favor competition - inducing the private sector to provide alternative Canadian northern signals on Canada's woefully underused eight-year-old Anik satellite system. "Too expensive," respond private broadcasters.

The cable companies also plead expense, but indicate they could be enticed if the revenue-producing sweetener of pay-television for southern markets were included in the same satellite package that sends "Lou Grant" to Faro. Nationalist groups oppose any saw-off that would bring in largely U.S. pay-TV - long opposed by the CRTC - in exchange for increased choice for the North. "Diabolical," says Vancouver Association for Public Broadcasting spokesman Tom Shandel. Nonetheless, a northern television package fuelled by lower Canadian satellite rental rates and other sweeteners reflects current thinking.

Meanwhile, new Communications Minister David Mac Donald has quietly been crossing the country conferring with provincial ministers responsible for communications.

But even as the bureaucracy lumbers along attempting to deal with the brush fires of a handful of pirates in the north, the DOC is conducting an experiment that may herald the arrival in selected remote and rural areas of northern B.C. and Ontario of about 100 home-top, 3.5-foot-diameter dishes. They will pick up Canadian Anik B signals and translate them for the home set with no cable company in the middle.

The implications are sobering. With progressively cheaper parts and simplified technology, dishes could replace both the rusting antennas of the 1950s and 1960s and the silvery cable of the 1970s, allowing Canadians to scan the night skies unhindered. Indeed, experts foresee a complete mixed system of satellite discs and cable by the 1990s. With the newly vacant space on cable which may then be filled with information retrieval and accounting functions, the DOC will be charged with the daunting task of drawing up a rule book in this startling new electronic ball game.

"There is clearly a sense of urgency," says the DOC's senior policy planner, Jean Fournier. Implied is a challenge to Canadian broadcasters, faced with a phantasmagoria of new and mainly U.S. signals. Optimistically Fournier talks of "the enormous marketing potential of beaming Canadian programming into the U.S." Others mutter about Canadian programming engulfed in a barrage of U.S. images. "We simply couldn't compete with unregulated U.S. programming," worries one CRTC official.

In Faro, meanwhile, the first unsettling whiffs of future shock have already begun to descend. For Iris Bowen the diversionary benefits of pirate dishes are tempered by concern that her nine-year-old is receiving a quick big-city education via the randy gutter dialogue of uncut movies on U.S. pay-TV. And across town at least one failing small business wishes it had never heard of earth receiver stations. It seems the discs can get the latest movies into the town's living rooms long before Faro's lone theatre is able to show them. Welcome to the 1980s.

PROGRAMMING CORRESPONDENCE

ARTHUR C. REVISITED

Here is another picture for you - a warning to others! It all happened in one second - I would never have believed that a wind gust could have moved a half ton of hardware such a distance horizontally. Anyway, since the antenna wasn't doing anything it solved one problem...

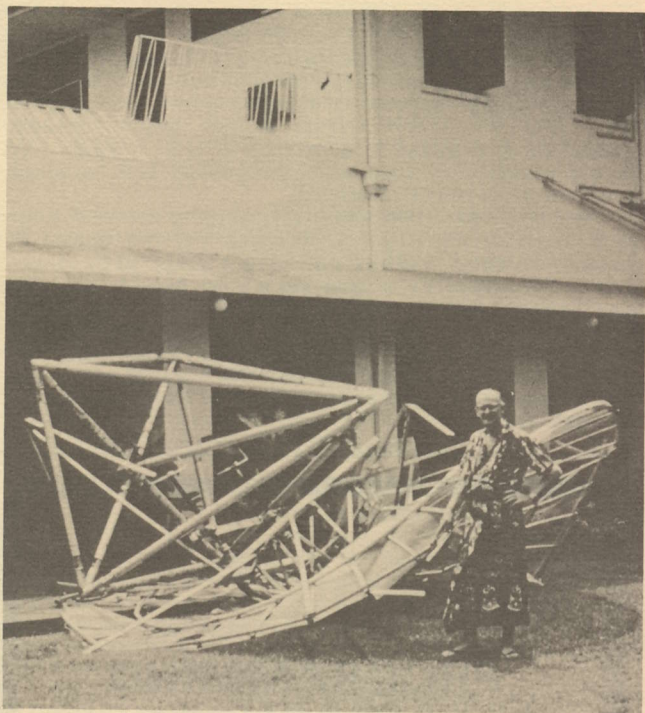
You would have enjoyed TELECOM 79, the exhibition preceding WARC. It was enormous - probably the biggest electronic exhibit ever. All of the COMSAT people were there including Hughes, Ford, Scientific-Atlanta. I met more people than I can remember including Group Captain (now Sir Edward) Fennessey, retired head of the GPO, who in 1943 selected Pilot Officer Clarke to work in GCA; and so is the grandfather of satellites!

(During TELECOM 79) I was the main INTELSAT 'exhibit', signing copies of a beautifully reproduced poster of the four page memorandum - now hanging in the Smithsonian - that preceded the Wireless World article.

On the bottom of Page P16 for October (CSD), I was the first with a porno network (see the short story 'I Remember Babylon' in 'Tales Of Ten Worlds'). I wrote this around 1959 to scare the U.S. into thinking about satellites! Little did I realize what your own (cable TV) systems would be doing one day...

Though I haven't had time to look into this (or the expertise now - I couldn't even draw a one-stage transistor amplifier since I still think in terms of glass bottles with red-hot hairpins inside of them) my feeling from a quick glance at the (STT) Satellite Wall Chart was that all of the Indian Ocean satellites would need far too large antennas. But all of that will change...

Arthur C. Clarke
Colombo
Sri Lanka



Arthur C. Clarke, our candidate for 'Father Of Satellites', was featured on the front cover of CSD for October, and his Wireless World article that described our present system, way back in 1945, was reprinted for the history buffs out there. Sadly, the 15 foot SITE experiment antenna shown with Clarke on October's CSD is now a pile of rubble [see photo]. But as Arthur notes, with SITE now dead and gone [and ATS-6 out of commission] this is one way to get rid of the antenna! [Note the broken bannister where the antenna plowed off of the balcony to the ground below.] It is our project for 1980 to try to locate some way for Father-Clarke to have satellite TV reception in Sri Lanka. We agree with him that the 22 dBw Global Beam transponders from INTELSAT are not all that attractive and really doubt he would be interested in regular viewing of the stronger [29-33 dBw] Russian Statsionar birds. We think that there must be an answer but for now we can't find it. Surely out there someplace there is a far-sighted equipment supplier that would like to be able to say in his advertising that "The Father Of Satellites Uses XXXX Equipment in Sri Lanka"! Intrigued suppliers, if any, should contact Coop directly.

UNFAIR ACTS

When I read of Coop's plight and court fight with the Common Carrier Association of America (CCAT) and the local Oklahoma City MDS outlet Movie Systems I was saddened. As I understand it, Coop wanted to teach the technology of MDS receiving systems as a minor part of SPTS '79 held this past summer in Oklahoma. It is truly a disgrace in this country when freedom of speech is impeded before the words are uttered, and technical conferences are subjected to the whims of special interest groups who actually want to stop the flow of technological information! I cannot understand the hypocrisy of a group that freely contracts with HBO or SHOWTIME to re-distribute their movies over MDS systems, knowing as they do full well that the mere re-transmission of these copyrighted programs invites people to set up BETA and VHS taping equipment to invalidate that copyright; and then turning around and claiming that your technical seminar is a violation of Section 605 and the 1976 Copyright Act! Then I understand that if this was not sufficient harrassment that the same groups filed against Coop at the FCC demanding that his developmental TVRO license be taken away. The efforts put forth out there in Oklahoma are appreciated; I want to lend to you my moral support and encourage you to keep on fighting not only for yourself but for all of the other experimenters in the

world. Keep the faith. We will triumph in the end.

Jerry D'Iorio
Boston, MA 02116

Those attending SPTS '79 in Oklahoma City were aware that just four days ahead of the Seminar CCAT and Movie Systems asked a Federal Court Judge to issue an order canceling the Seminar. The Judge listened to the evidence and then ruled against CCAT and Movie Systems and the Seminar went on. Meanwhile the same heavies went to the FCC and claimed Coop was engaging in all sorts of prohibited and illegal activities with his WF92 terminal. It took numerous pleadings, meetings with FCC attorneys and volumes of paper to straighten that one out. In the end CCAT and Movie Systems withdrew their FCC complaints and several thousands of attorney spent dollars later it was all forgotten except for the box of legal papers stuck up in a corner in Coop's downstairs Lab room. CCAT won nothing except some cheap trade press sensationalism stories. Their Washington based attorney-coordinator will probably get a big fat raise for raising all of the issues he did; although if he was paid on a merit basis he would owe them money instead!

PROMOTIONAL DATA AVAILABLE

ALTERNATE INFORMATION SOURCES

Satellite Week (1836 Jefferson Place NW, Washington, D.C. 20036) is a weekly first-class-mail delivered newsletter providing extensive coverage of legal, WARC, programming and satellite operational news in abbreviated format. Exceedingly well done but expensive. Subscription price is \$327 per year.

Satellite News (8401 Connecticut Av., Washington, D.C. 20015) is issued twice per month and mailed via first class mail providing coverage of programming and satellite operational changes (does **not** include program **schedules** in case you wonder) in the satellite business. Subscription is \$147 per year; differs largely from Satellite Week by having slightly greater in-depth material.

For fans of everything that appears in print dealing with satellite television, these materials are now available or will be available shortly:

RADIO ELECTRONICS MAGAZINE - Part four of the seven part Coop epic appears in the current January issue; parts 5 through 7 will follow monthly. These last four parts (1 through 3 appeared August-October) will deal primarily with assembly off a low cost terminal utilizing hybrid Swan/Howard/Coleman technology. **Note:** Coop is scheduled to begin a regular **monthly** 'column' in this publication with their March issue; the column will deal with the development of low cost satellite TV technology in an abbreviated format.

POPULAR SCIENCE - Another Coop produced piece will introduce the several million regular readers of PS to the wonderful world of geostationary satellites in their issue

dated for March (due out in mid-February on newsstands). Largely a synopsis of things you already know, in abbreviated format because of space limitations but worth adding to your library.

ENTREPRENEUR - The December issue carried a report on the business opportunities in MDS (multi-point distribution systems) and some coverage of what is happening with low cost satellite systems. Thrust of publication is directed at people with dollars and time to invest in 'new' business opportunities. MDS report is factual but we felt it skirted the 'piracy problem' too lightly. If you have aspirations to connect your TVRO terminal to an MDS transmitter and 'share' (as in selling) the service to other residents of your area, we recommend getting a copy of the December 1979 issue from: Entrepreneur Magazine, 631 Wilshire Blvd., Santa Monica, California 90401.

ABOUT INSTANT REPLAY

Those attending SPTS '80 in Miami will have the opportunity to watch an extremely professional and innovative group of video professionals at work; the staff and crew from INSTANT REPLAY.

Instant Replay is a 'video magazine'; publisher Charles (Chuck) Azar believes his publication is the front running vanguard of the form of all publications of the 80's. Says Azar "Television in the eighties and beyond will be an active rather than passive instrument. Linked to personal computers and accompanied by cassette recorders and video disc players, the television will serve as filing cabinet, bank book, communications center and information headquarters in the streamlined household. And yet it may continue to be a source of entertainment..."

IR (as it is fondly known) distributes on tape (Beta or VHS) worldwide through the mails and through a network of dealers. IR approaches a topic just as any other publication does. Will the material be interesting, entertaining and/or educational for "readers" (viewers)? Only unlike the traditional journalist Azar and his inexhaustible crew travel the world lugging around portable color cameras and video tape gear. A fair amount of Azar's "beat" is the electronics world since he shrewdly deduces that many of the early buyers of home VCRs are themselves somewhat hung up on things electronic. Chuck looks for people who have made major contributions to the explosive growth of electronic communications, runs them down and then spends a day or two capturing them on videotape. Back in Coconut Grove, Florida the IR production crew edits the material down into a series of 'articles' that fill the typical two hour magazine each issue. Sports, events, and unusual thrill rides that capture well on videotape are also

heavily covered. Would you like to take a ride in the cockpit of a famed World War II P-51 fighter plane? A recent IR did this. Visit Dr. Vladimir Zworykin, the inventor of electronic television? IR does this. Or travel to Germany where IR attended the Internationale Funkausstellung '79, the world's largest and most important A-V festival? IR did this also and threw in a visit to a most impressive German INTELSAT uplink terminal at the same time. Satellite television gets good coverage on a regular basis. Azar has many friends in high places in the electronics and satellite fields and he managed to squeeze comments out of Sony on their satellite TV hardware plans in a recent edition as well.

IR is good viewing and very informative at the same time. It plays well again and again and because it is an innovative approach to electronic publishing it is attracting plenty of interest right now from others who will surely follow in IR's footsteps. One is bound to notice that Time-Life is a heavy investor in videotape projects these days and the day is undoubtedly coming where Azar will have some pretty stiff competition in his field.

For now he is the pioneer and his work is worth every penny of the modest subscription price. We think you will enjoy Instant Replay and we encourage you to seek out the IR booth at SPTS '80 in Miami to find out just how far video journalism has come in two short volumes of this innovative video magazine.

Bob Cooper's Satellite Television Technology prepares a weekly one hour television program for continent-wide distribution via satellite on **SPN** transponder 21 at 12 noon (eastern) each Thursday. Two 'new' programs are prepared each month and each program runs for two consecutive weeks.

During the past fall satellite technology noteables such as H. Paul Shuch, Oliver Swan, Taylor Howard and many others have appeared. The program attempts to cover the fast moving technology explosion of both satellite and cable services and much of the video material utilized is shot 'in the field'.

SPN is a no-charge service and this service typically grants permission to home viewers to tune in the program without hassle. Specific approval for viewing **Satellite Magazine** can also be obtained directly from Bob Cooper at Satellite Television Technology (P.O. Box G, Arcadia, Oklahoma 73007). When your terminal is up and running, tune us in!



IR PUBLISHER CHARLES AZAR (right) with **Dr. Vladimir Zworykin**, creating the mood for a visit with the famous inventor of electronic television. IR can be found at 2980 McFarlane Rd., Coconut Grove, FL 33133 (305/448-7088).

BIRD OPERATIONAL NOTES

Looking for sources of HBO, Showtime and Madison Square Garden program listings? Many newspapers (New York Daily News, Miami Herald, etc.) now publish daily listings for their subscribers. Additionally, there are many editions of **TV GUIDE** (which is published and distributed nationally but with regional editions for differing program listings to match the local TV fare) which have one or both sets

of premium television listed.

A subscription to **TV GUIDE** (the **New York City Metro Edition**; from TV GUIDE, Box 400, Radnor, Pa 19088 at \$18 per year) is one source that combines both HBO, Showtime plus Madison Square Garden listings. Another source is **TV WORLD** (505 8th Avenue, Suite 1801, New York, N.Y. 10018) which includes listings for satellite signals WOR (transponder 17, WTBS (transponder 6), Madison Square Garden Sports (transponder 9), Home Box Office (transponders 22/24) and Showtime (transponders 10/12). The subscription price for one year is \$12.

Then there is the announcement that a new publication called **'Satellite Guide'** will be available starting with the month of February. SG, we understand, will have day by day listings for all of the (SATCOM) transponders and the one year subscription price is pegged at \$28. You can make inquiry at **Satellite Guide**, P.O. Box 1569, Hailey, Idaho 83333.

Approximately 50 of the Holiday Inns scheduled for TVRO installations are now operational. Job is being split between Scientific-Atlanta and Microdyne/AFC. In Houston area two Ramada Inns have also installed TVROs on an ad hoc basis, not as a part of any yet approved Ramada Inn national policy.

WOR-TV became 24 hour per day service recently running vintage movies through the wee hours on transponder 17. **STAR CHANNEL** officially changed name to **THE MOVE CHANNEL** ON December first and also became first premium program supplier to go to 24 hour per day service (transponder 5 all day and night; transponder 11 nighttime only).



In approving RCA launch of FIII late in November FCC asked satellite firm to provide informational detail on the way transponders are assigned, on semi-annual basis. Until now FCC has stayed out of squabbles between satellite ops and transponder users. Galavision and Eastern Microwave (WOR) have filed objections to manner RCA handles 'customers'. Galavision renewed contract with Reuters for nighttime use of transponder 18 for Spanish language premium program feeds through 1981 but still seeks transponder assignment of its own. New transponder 4 (FIII) National Christian Network will be 24

hour per day service.

Westar 1 transponder 7 has been experiencing output problems; is being run at 6 dB down reduced output much of the time.

SPN has added "All Night At The Movies" service from 1 to 7 AM (eastern) on transponder 21. Movies are from 1930's to 1950 era.

Cineamerica will be new national satellite network for people over 50 years of age on FIII; Satellite Communications Network is another with programming from Ohio Premium Network. **ESPN** has taken transponder 7 on FI as well as FIII and will use second transponder for feeding events back to headquarters in Ct.

Latest 'group' to eye satellites are newspaper publishers who see national satellite inter-connection as way to increase delivery of high quality advertising formats, news services and other material.

Monday Night Boxing ("live") from various U.S. locations will debut on January 21st. One hour telecasts will be up at 10 PM eastern weekly on FI (then FIII when operational).

Another new service scheduled for Spring operational date is 6 hour daily feed of **BBC** programming from England brought to satellite by Time-Life Satellite Network (TLSN). Schedule calls for 8 PM to 2 AM feeds (eastern) probably on transponder 20 (sub-let from HBO).

TCI, Denver based firm that has agreed to purchase \$5 million in **HOMESAT** terminals from S-A, is now installing terminals. Rate is \$150 per month (after \$3,000 installation fee) for seven year contract (\$15,600 total) on lease; service consists of HBO and TCI pays HBO fee. TCI says market is 300,000-plus ranches with annual (gross) incomes of over \$50,000 per year; most early installations have been in Montana but area is now expanding throughout Rocky Mountain area. **HOMESAT** says they plan to be able to deliver up to 200 terminals per month with 3 meter antennas before end of first quarter this year.

European TV Service has begun feeding weekly news feature magazine directly to PBS stations via **WESTAR 1** (Tuesdays, probably on transponders 8, 9 or 11). Spanish version is telecast on Wednesdays.

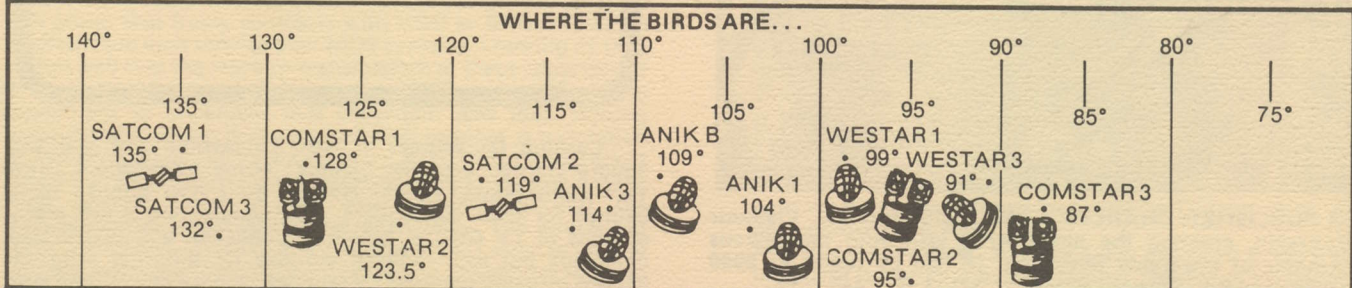
Madison Square Garden Events (transponder 9, FI/III) began schedule of indoor soccer league games in December; will continue through mid-March.

Mysterious coverage from **ANIK-B** (operating both 4 and 11/12 GHz downlinks at 109 degrees west). 4 GHz service is reported sparkle-free as far south as **Miami** (Fl.) and over all areas to north along east coast on 12' dish, 120 LNA.

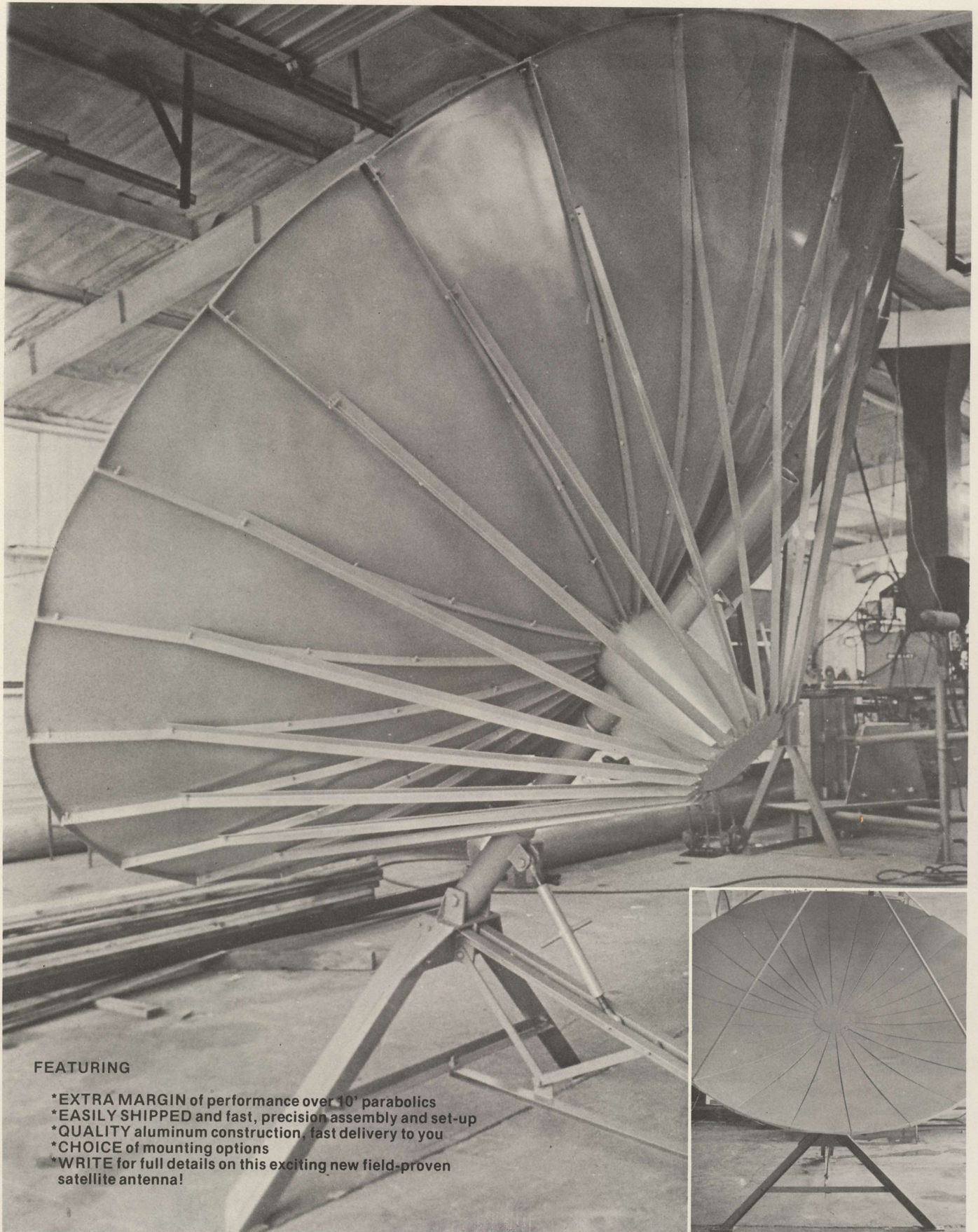
SPLIT ISSUE

Effective with this issue of **CSD** those people who have ordered only a single section (such as the Programming Section, which you are now reading) will be receiving only the section ordered. Prior to this time **CSD** has been supplying both sections to all readers simply because the small number of "one-section-only" readers has not made it worth our while to separate issues. However with the subscription list growing rapidly, the time has come to deliver to you what it was you ordered. If you have grown attached to the full issue (Technical plus Programming) you may upgrade at this point by requesting same (provide your name, address and mailing label) with a \$20.00 check attached.

WHERE THE BIRDS ARE...



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FEATURING

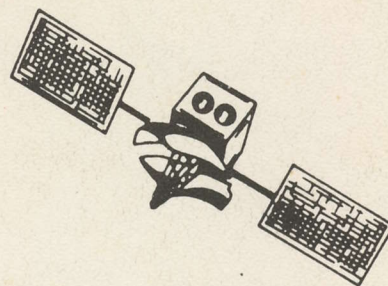
- *EXTRA MARGIN of performance over 10' parabolics
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SPTS '80



MIAMI, FLORIDA

FEBRUARY 5, 6, 7

MIAMI'S BAYFRONT PARK AUDITORIUM

THE BIG EVENT! Following the same highly informative and successful format of SPTS '79, Bob Cooper opens the 1980 Satellite TV season with SPTS '80 February 5, 6 and 7 at the Bayfront Park Auditorium in Miami, Florida. Three big days of technical lectures, marketing sessions, exhibits and live satellite demonstrations all designed to bring you up to date on the fastest emerging new television technology of our time!

THE EMPHASIS IS EVERYWHERE! For the technology buff, Stanford's Taylor Howard and Robert Coleman of South Carolina have merged their talents to create a **new** single conversion super receiver for the 80's! Active GaAs-FET technology front end and mixer, combined with a new Howard-Coleman solid state 70 MHz i.f. and demodulator circuit will be shown for the first time at SPTS '80 in Miami. A truly simple, high performance receiver! **For the business person**, numerous panels dealing with the newest in commercial hardware, receive system marketing experience and the impact of the FCC's deregulation of licensing. For the system designer and engineer, 12 (twelve) H. Paul Shuch 'TVRO Symposium' sessions designed to teach you 4 GHz technology from the sky down!

FOR EVERYONE - exhibits, operating satellite terminals, satellite system videotapes and plenty of literature and hard to find satellite TV data. **FOR CARIBBEAN, CENTRAL AND SOUTH AMERICAN RESIDENTS** - two special sessions (in Spanish) detailing the reception conditions and requirements in that area of the world. **PRE-REGISTRATION IS MANDATORY!** Every indication is that this 1,000 seat auditorium will be filled to capacity with pre-registrants by the middle of January. To be sure of getting into SPTS '80/Miami, send off your registration application today. Full hotel / motel registration data will be sent to you with your confirmation.

____ **\$150 PER REGISTRANT ENCLOSED.** Please rush our confirmation and the information regarding hotels and motels.

My Name _____

Company (if applicable) _____

Address _____

City _____

Enclose full payment in U.S. funds for all registrants and mail to:

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